

ERS-560 / 560DX Ultrasonic Level Monitor

Instruction Manual
Series 'E', Rv 2020.2.5

CONTROL ELECTRONICS, INC.



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Electronics

Power Requirements: 120/220 VAC, $\pm 15\%$, 50/60 Hz
12-24 VDC @ 15W max.

Temperature: 30°F to 120°F

Display: 2 line x 20 character, Alphanumeric, LCD with LED backlighting

Outputs: Two (2) independent 4-20 mA isolated into 1000 ohm, RS-232 terminal and RJ11 modular jack, 5 relays SPDT 5A/250 VAC contacts

Span Range: 0-10" to 0-220"

Dead Band (blinking): 12 to 36 inches

Display Resolution: 0.01" Level, 1 gallon

Accuracy*: $\pm 0.7\%$ of range

Memory: Flash and non-volatile RAM

Volume Equations: Cylindrical; Rectangular; Square; Sphere
Horizontal; None

Data Log: **200 day 24 hour Summary:** MIN, MAX Level, End of day Level and total gallons - time stamped
Discrete: Sampled Level in inches, sample rate 1 to 99 minutes - time stamped
Event List

Sensor w/temp probe

Material: PVC Housing, Epoxy

Beam / Freq. 5° Conical, 40 kHz pulsed

Temperature: -40°F to 160°F

Cable: **30 foot corrosion resistant, 600 ft. max spliced, Belden #8451 or equal**

Dimensions: 3.0" dia. x 2.5" Len

Mounting: 3/4" NPT male

Enclosure

Material: Fiberglass with clear hinged Polycarbonate cover

Rating: NEMA 4X, IP65, Dust-Tight, Water-Tight, Corrosion Resistant, CSA, UL listed

Dimensions: 7.2"x11.8"x6.8"

Mounting: 4.92"x12.3" with stainless steel mounting feet

Options

PVC Sensor Mounting Bracket, Sensor Cable

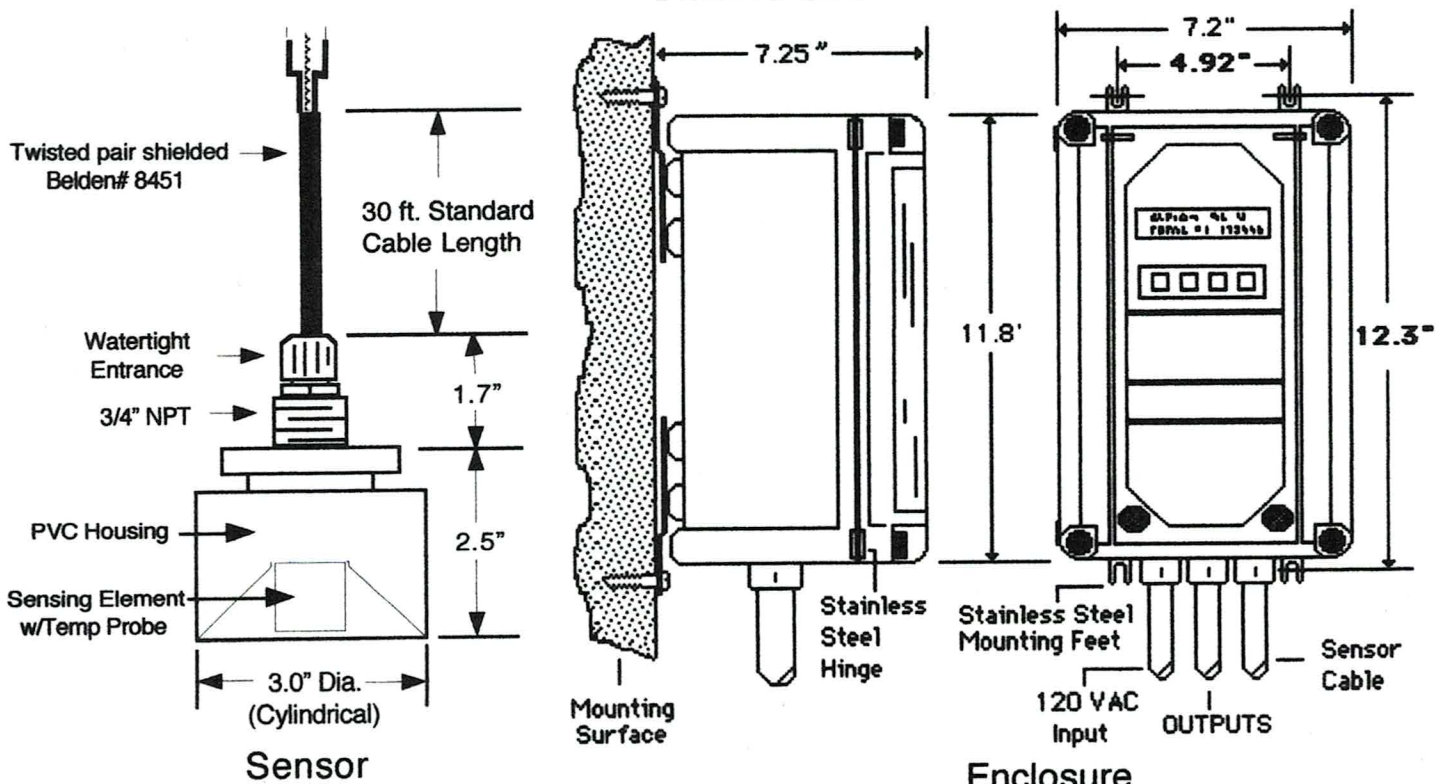
Warranty: the ERS-560 system is pretested and inspected before shipping. Warranty is against defects in parts and workmanship for a period of one (1) year from ship date.

Note: ERS-560DX System does not have relay outputs, RS-232 output and Data Logging.

* field conditions, such as turbulence, poor installation etc., may affect the apparent accuracy.

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

DIMENSIONS



Repair Policy: All repairs are performed on our premises. Repairs must be sent by UPS prepaid. **NO RMA** number is required. However ...

Customer must enclose:

- 1] a description of problem
- 2] who to contact
- 3] phone number
- 4] return ship-to address
- 5] **method of payment**, Credit Card or COD. A Company Purchase Order Number must be supplied if other payment method is to be arranged.
- 6] **Unit / Sensor must be cleaned** before shipping . We reserve the right to refuse repair of a product that has not been received cleaned. **Cleaned unit means** removing any debris that may be clinging to the unit; wiping off loose dirt, cob webs, dead insects etc. A \$ 50.00 charge to repair may be applied to clean unit before repair.

Delay of repair may occur if any of the above is not provided. Most repairs are processed and shipped within 48 hours of receiving repair.

Repair Cost: A minimal charge will be applied regardless of repair needed plus return shipping charges. If repair exceeds quoted minimal charge (call factory for quote or visit our web site under support), we will notify the customer before we proceed.

Payment is COD or Credit Card only unless other arrangements are made.

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

Return Policy: We 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 sensor, poor liquid surface with turbulence, **interference from other equipment** etc.) , product is misapplied or not used properly and/or if product is out of warranty.

A **35% restocking charge** will be applied if the product is returned for credit after 6 months from ship date.

We do not accept returns of options such as used Sensors, cables, or spare parts unless shown to be defective under warranty or not performing as specified.

Any credit issued will be at our discretion. 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 we will consider any credit. The name of who to contact along with phone number should also be included with the return.

Packing: Repair/returned units must be packed (not loosely) in a suitable card board box with sufficient packing material (newspaper, packing peanuts etc.). We are not responsible for any product damaged through shipping. Make sure you insure the package for replacement cost. **DO NOT pack the unit upside down or sideways in the box.** Damage could result to product if you do.

Ship To Address: All repairs or returns must be shipped prepaid via UPS or equal to:
Control Electronics Inc., 148 Brandamore Road, P.O. Box 330, Brandamore, PA 19316

ERS-560 Product Performance

The ERS-560 meter will perform as specified when tested under known, simulated conditions. All ERS-560 meters are tested for full functionality and performance before shipping.

The *accuracy* of the product is determined by inputting a known, stable target distance into the system and monitoring its ability to process the return ECHO delay accurately and conversion of the calculated DEPTH indication to GALLONS as related to the built-in equations. Specifications for the product are determined by this method.

The *accuracy* of the product is not determined by any other method. Other test methods indicate the accuracy of the over-all application / installation, not just that of the product. Such tests are not acceptable as an indication of product(s) accuracy. However, other tests methods can be used to determine if the calibration of the product should be changed in attempt to compensate for application / installation conditions. This should only be done if no other application / installation corrections can be initiated to correct the problem.

Some examples of application / installation issues:

- 1] Wet Well / Tank not measured properly
- 2] Vapors from liquid or severe air density changes
- 3] Turbulence or foaming on the liquid surface
- 4] Liquid surface is foam covered
- 5] Temperature is different at bottom of well / tank than at sensor
- 6] Sensor not installed properly

Some equipment such as variable speed drives, nearby radio transmitters etc. located next to the product or even at times in adjacent rooms may possibly interfere with the products performance. Variable speed drives produce large amounts of electrical and RF (radio frequency) noise that can interfere with the products ability to interpret the return ECHO signal. Ultimately, it is up to the user to make the corrections necessary and require that the source of the interference be corrected.

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

PRODUCT WARRANTY

WARRANTY:

The seller 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. The seller's obligation under this warranty is limited to the replacement of the product(s) by same product(s) or repair of the product(s). 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. Under no circumstances will the seller be liable for any loss, damage, expense, or consequential damages of any kind arising in connection with the use, or inability for use of products.

WARRANTY PERIOD:

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

LIMITATIONS:

Products must be installed and maintained in accordance with 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 the seller. Claims against carriers for damage in transit must be filed by the buyer. The seller is not liable for labor costs incurred in removal, reinstallation, or unauthorized repair of its product(s). The 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 product(s) 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 the seller at no charge to the buyer. The defective product(s) must be sent, freight prepaid, 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, and/or return product(s) unused for credit. This action must be made within 60 days from ship date. Installation of product(s) or non-response within 60 day period indicates the buyers acceptance of product(s) and above warranty.

IMPORTANT NOTICE

It is recommended that the ERS-560 Level Monitor be installed and tested first to confirm the operation and tracking of liquid level before allowing the system to take control of pumps, valves, alarms etc. Provisions for emergency back-up control (i.e. floats) should be provided in the event of system failure.

Control Electronics Inc. does not assume any responsibility or liability for damages, losses or cost incurred resulting from a failed system. It is the responsibility of the user to provide backups in critical applications.

Installation Tip

It is best that the sensor be installed as close to the high level point of the liquid surface in a wet well to reduce the overall operating range of the system and to obtain a truer temperature reading in the wet well for best results.

If you have any questions, please contact Control Electronics at 610-942-3190.

This manual covers both the ERS-560 and ERS-560DX Units. The ERS-560DX unit is the same as the ERS-560 unit with the following exceptions:

The ERS-560DX does not have ...

- 1] Relay outputs
- 2] No clock or date
- 3] No Data Logging
- 4] No RS-232 port

You may want to copy the following numbers from the upper left corner of the printed circuit board inside the enclosure for your records. These numbers should be available if calling Control Electronics for tech support.

Serial Number: _____

Software (RV)#: _____

Model Number: _____

INTRODUCTION

Control Electronics model ERS-560 Ultrasonic Level Monitor is a microprocessor controlled, non-contacting Level Monitoring system designed to control up to 5 pumps, valves, alarms with alternating capabilities. The system will accurately measure most nonvolatile liquids and volume in most standard tanks, wet wells and container shapes. The system uses Ultrasonic Echo ranging techniques to monitor the liquid level. Maximum range (distance from the sensor to liquid level) should be limited to 16 feet for best performance (max 24 feet). This information is used to control the pumps, valves etc., calculate the volume in gallons and produce two 4-20 mA. outputs proportional to level.

The ERS-560 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 container/wet well to calculate volume and relay ON/OFF elevation points to control pumps, alarms etc. Control Electronics has been designing and manufacturing Ultrasonic type meters since 1980.

The Sensing element is a non-contacting probe capable of transmitting and receiving high frequency sound waves. The Sensor requires less transmit power than most other systems. A pulse of approximately 40 to

60 volts peak-to-peak is required as opposed to some manufacturers that use as much as 400 to 1700 volts to pulse their Sensors. The higher voltages are hazardous to personnel and explosive atmospheres. Additionally, the ERS-560 Sensors unique design reduces both the dead-band (minimum range) and the signals beam spread. The sensor, model US70TC, is suitable for Class 1, Div. 1, Groups C & D and Class II, Div. 1, Groups E, F & G environments. The sensor is PVC construction and should not be used for volatile liquids such as gasoline, solvents or other highly volatile product.

All ERS-560 circuits are protected in a NEMA 4X corrosion resistant fiberglass enclosure with a clear polycarbonate hinged cover for easy viewing of level and programmed data.

After installing the fLevel Monitor and Sensor, the operator will find the ERS-560 Programming Flowchart in the back of this manual extremely helpful in navigating through the many options and features of the Monitor.

IMPORTANT NOTICE

It is **STRONGLY RECOMMENDED** that the user install backup floats or other methods for LOW and HIGH level sensing in the wet well / tank in the event there is a failure of the ERS-560 system when controlling processes.

Control Electronics, Inc. does not assume any responsibility or liability of problems, damages or loses resulting from a failed system. It is the responsibility of the user to provide backups in critical applications.

INSTALLING THE LEVEL MONITOR

The ERS-560 Level 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. Controller Installation

The ERS-560 electronics controller is housed in a NEMA 4X fiberglass enclosure. This enclosure is UL listed and 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 should be made to maintain a temperature range between 25°F and 120°F within the enclosure. For cold locations, our optional Heater and Thermostat should be considered. This option can be installed at any time by the user. In warmer climates the enclosure should 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 above ambient temperature causing malfunction and/or possible damage to the unit. A Sun Shade should be provided.

The ERS-560 Electronics requires a 120/220 VAC power source. Though the meter is designed to minimize electrical noise 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 may be located up to 1000 feet from the measuring site. It is recommended that you keep the distance as short as possible. Metal conduit will be required between the measuring site and controller (note: do not attach metal conduit to sensor). It is important that no other cables run in this conduit. Cable lengths less than 50 feet may be run in PVC conduit if there are no other AC signal wires in close proximity.

Once a suitable location has been selected for the controller, carefully screw mount the enclosure as shown in figure1. Be sure to allow room for the conduit entrance to the enclosure as shown. All conduit entrances must be made through the bottom side of the enclosure. Do not enter through the top. This could cause possible water damage from leaks if the enclosure is rained on or hosed down. Separate conduits should be provided for AC power source (conduit not required if supplied with optional AC power cord), output signal wires (4-20 mA., relay outputs etc.) and Sensor cable.

Protect the electronics circuit card from damage when punching holes in the enclosure for conduit entrance. The circuit card may be removed from the enclosure by removing the four retaining screws (along the top and bottom edge of circuit board) and unplugging the ribbon cable. A GREEN-LEE punch is recommended for punching the holes.

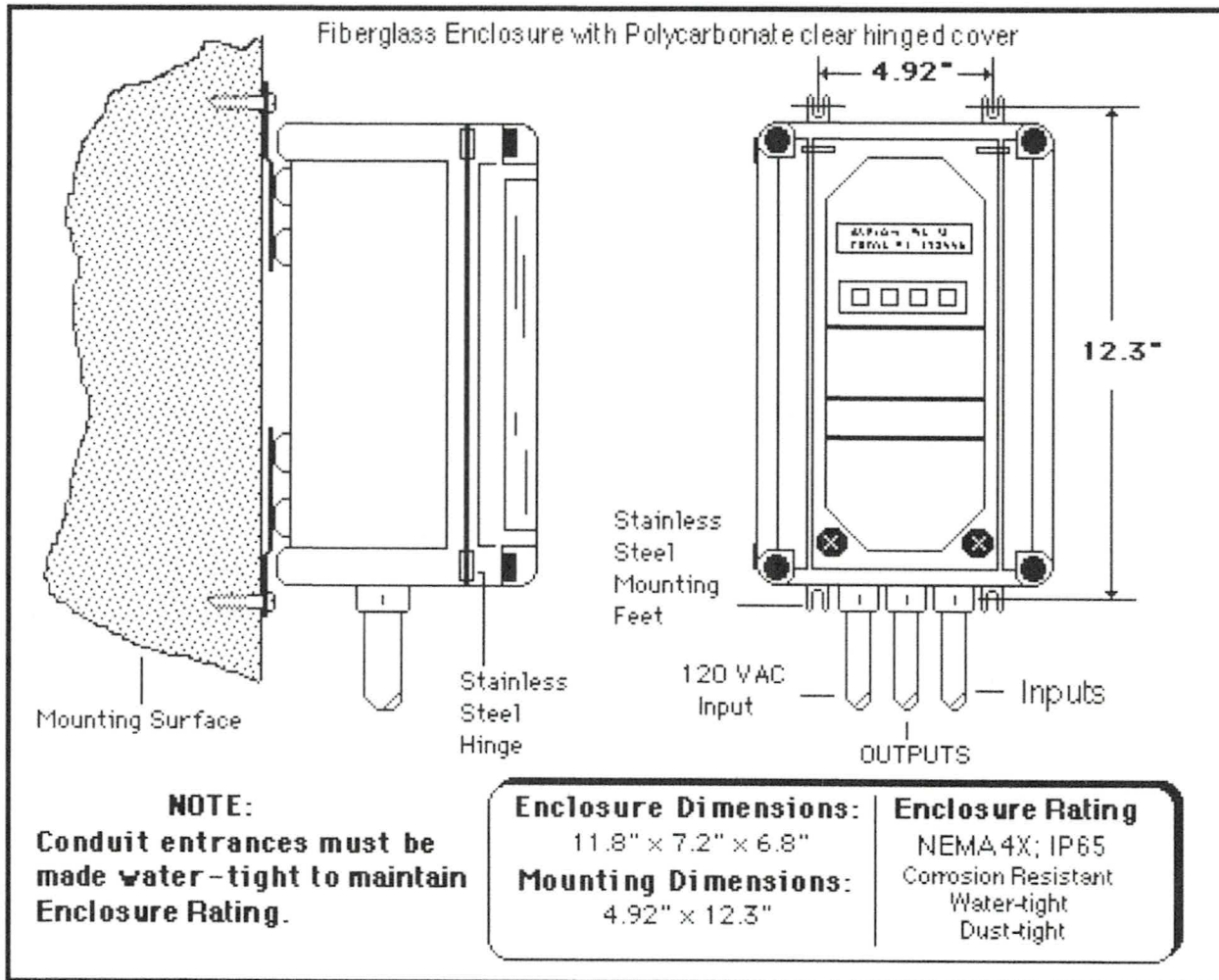


Figure 1.

Enclosure Installation Notes

- 1] Mount enclosure in a suitable location as described above. DO NOT locate in a confined or hard to reach area.
- 2] All conduit/wire entrances must be made at bottom of enclosure.
- 3] Conduit/wire entrances must be watertight to maintain enclosure rating. Use electricians putty or caulking to plug conduit entrances to prevent condensation and vapor migration.
- 4] Do Not mount enclosure in direct sun light. This could raise the internal temperature above ambient and damage the unit. A sun shade should be considered.

2. Sensor Installation

The Sensor location over the liquid to be monitored is very important so the ERS-560 can accurately measure the liquid depth. Use the following guidelines:

- 1] Be sure there is a clear, non-obstructed signal path from the sensor to the surface of the liquid. The sensor should be mounted away from protruding obstacles such as pipes and ladders. Maintain a minimum horizontal distance from obstacles of 2 inches for each 1 foot vertical distance from the sensor for best performance. i.e. if the obstacle, such as a horizontal fill pipe, is located 5 feet down from the sensor, mount the sensor at 10 inches off to the side. Consider any pipe flow that may enter the tank or wet well crossing the path of the sensor. See figure 2 below.

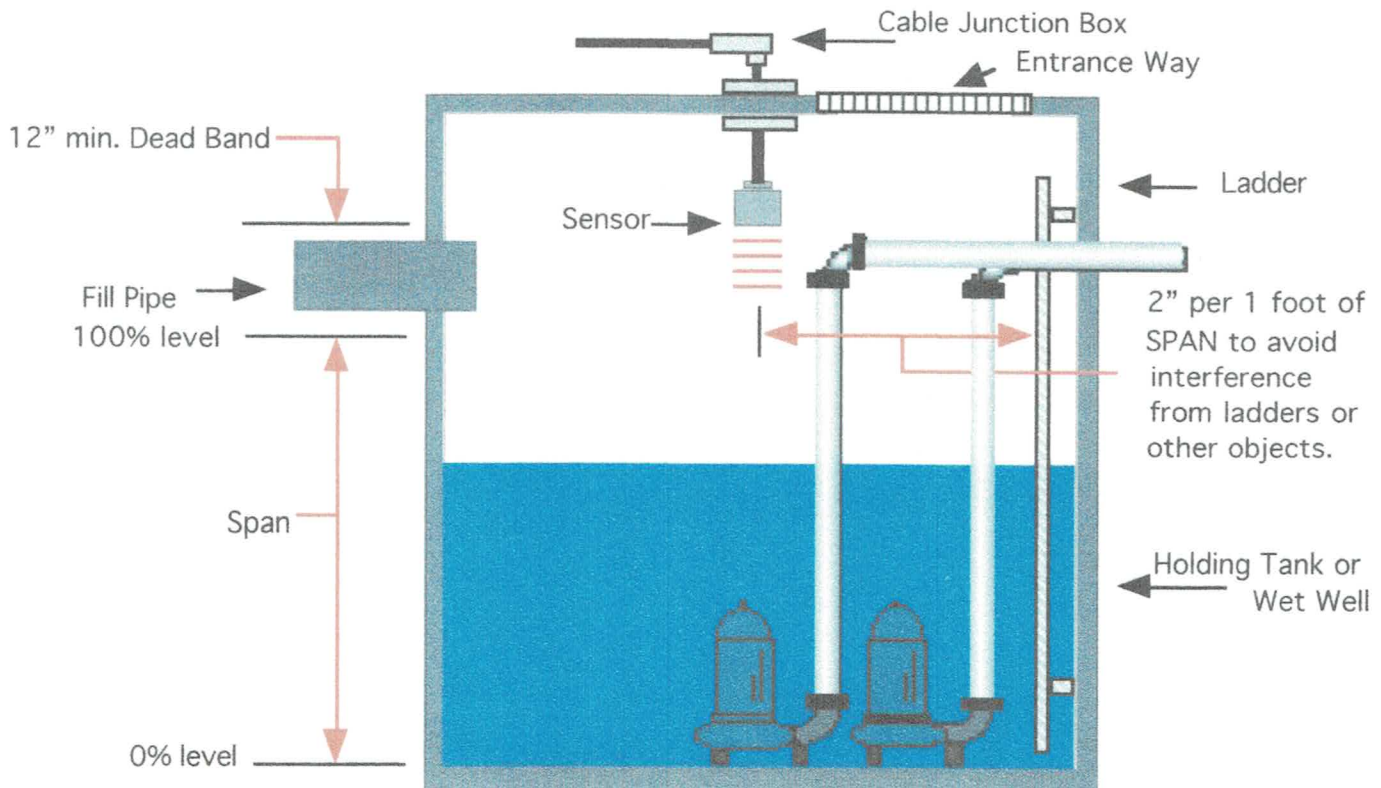
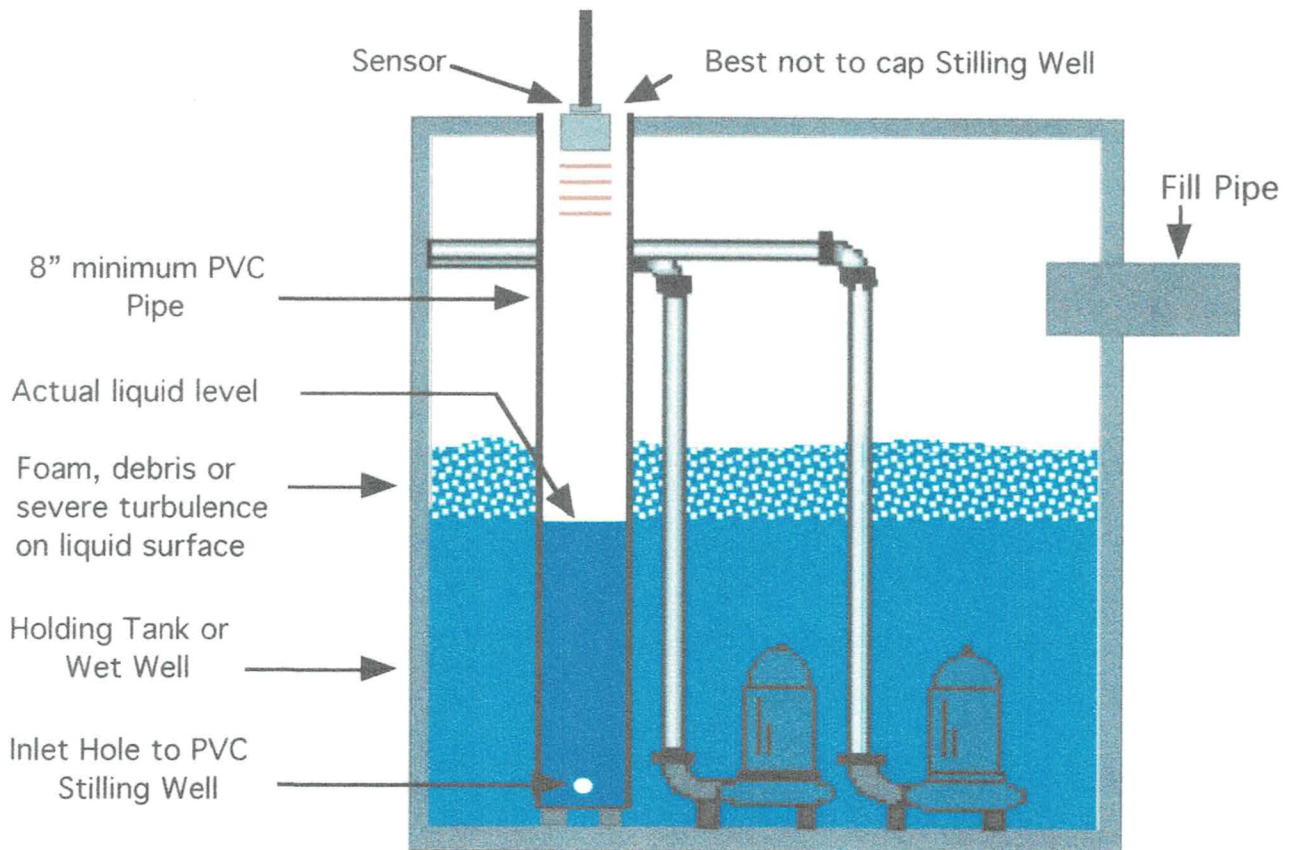


Figure 2, Sensor in Wet Well

- 2] The sensor should take into account the 12.0" minimum DEAD BAND as specified. If the liquid surface comes closer than the specified DEAD BAND to the sensor, the system may not respond to further level increases and all readings may be considered invalid. In some cases the DEAD BAND may need to be increased due to application issues. See adjusting the DEAD BAND in manual.

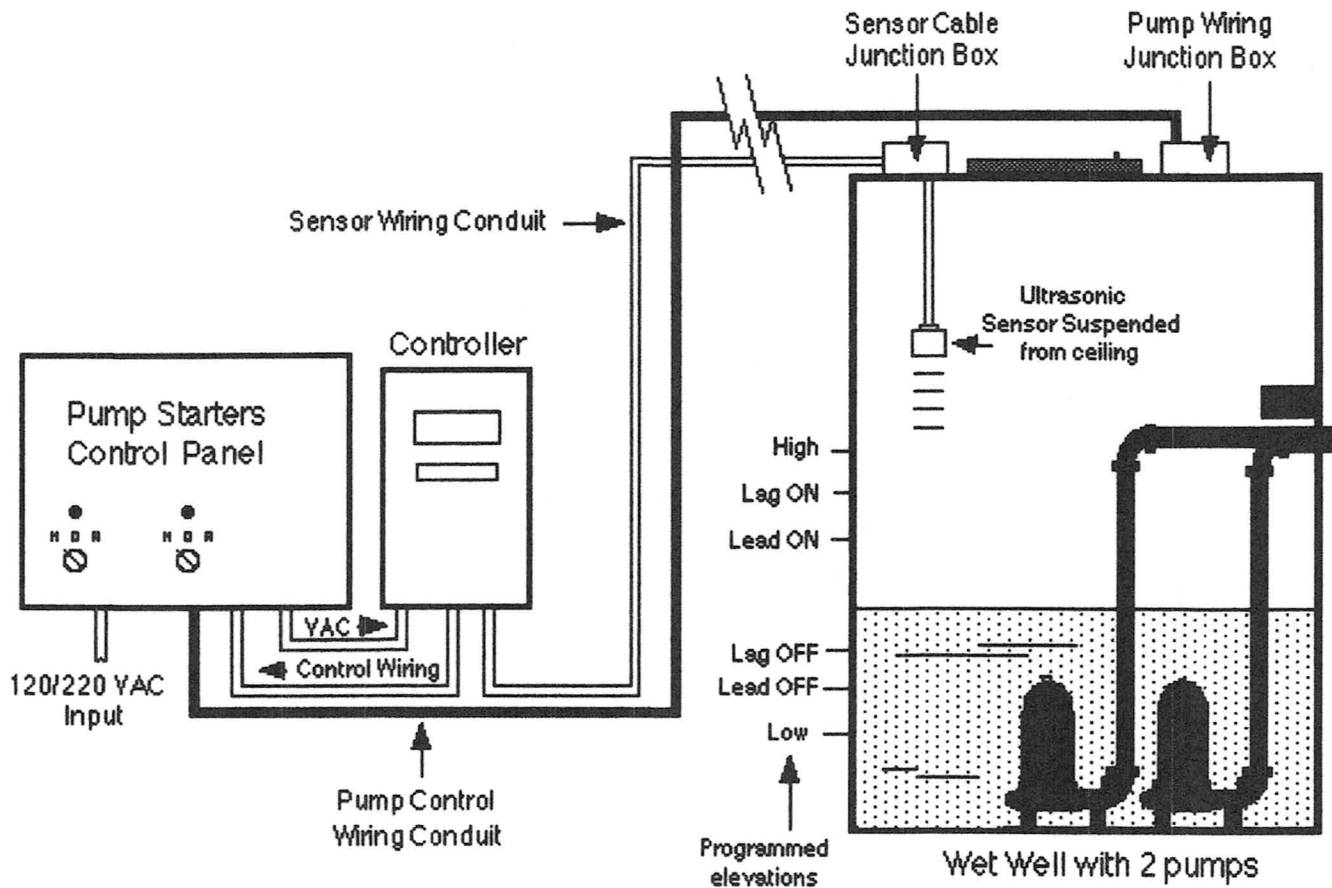
- 3] Do not locate the sensor over the fill area. Filling the tank or wet well may cause surface turbulence. Severe turbulence may interfere with ECHO signal return.
- 4] The sensors radiating surface must be parallel to the liquid surface or the returning ECHO may be reflected away from the sensor.
- 5] A stilling well may be used if there is difficulty in measuring any liquid level due to turbulence, foaming etc. The stilling well must maintain a smooth inside surface for best results. Eliminate any grease buildup on the inside walls of the stilling well and remove any gasket protrusion if two sections of pipe are joined to form a longer pipe. We recommend at least an 8" diameter or greater PVC pipe stilling well.

Using A Stilling Well



IMPORTANT

DO NOT use any metallic pipe or fittings to mount the sensor. The sensor MUST be mounted to PVC or other plastic type material for the sensor to work properly - NO EXCEPTIONS!



Installation General Overview

The Sensor is provided with at least 30 feet of cable (standard). An electrical non-corrosive plastic junction box should be located near the Sensor to allow splicing of its cable to additional cable length, if required. Use supplied cable (optional) or twisted pair shielded (Belden# 8451 or equal) for the sensor connection.

IMPORTANT

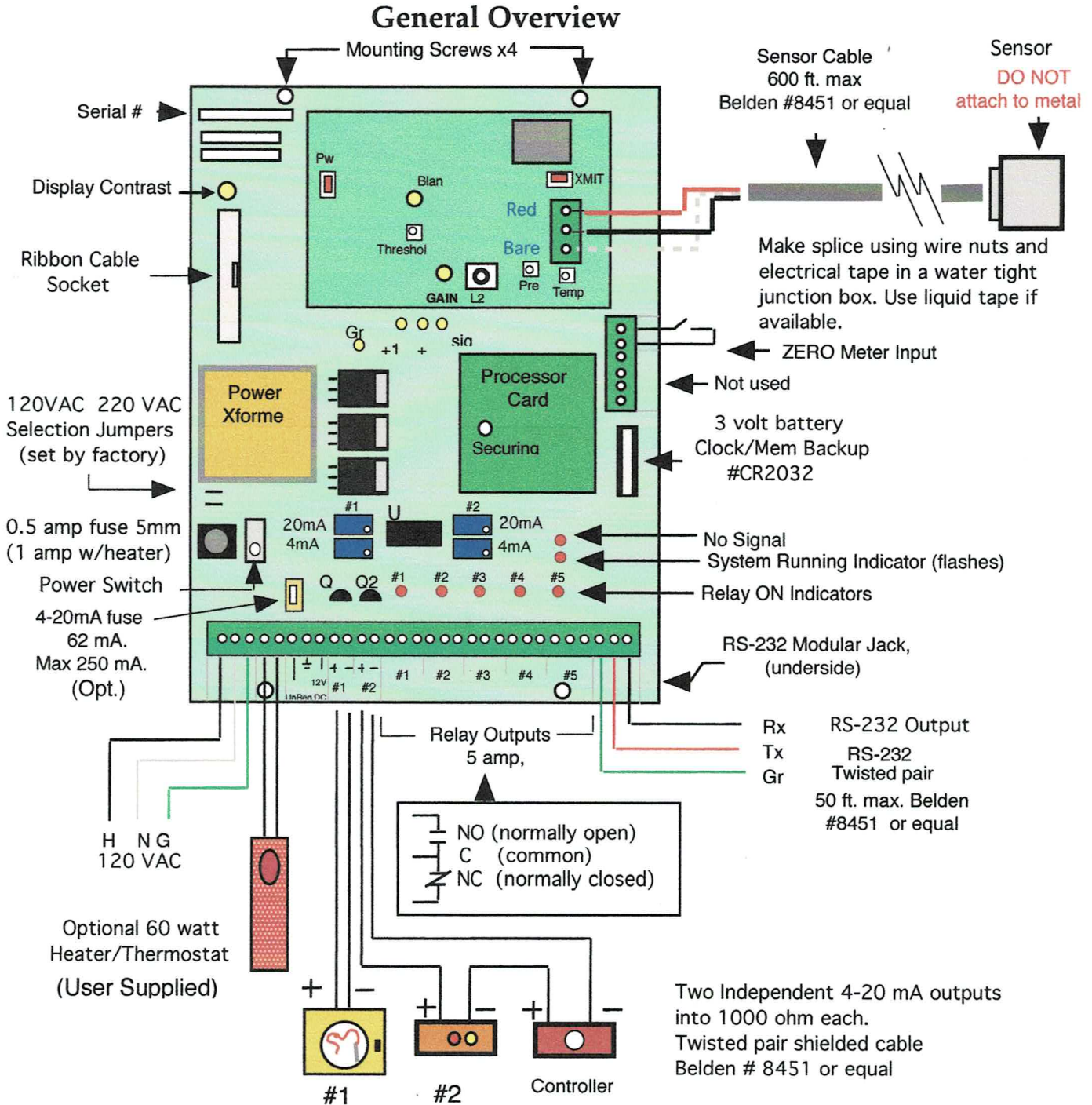
If the flow surface comes closer than the specified or programmed DEAD BAND to the sensor, the system may not respond to further increase of level and all readings may be considered invalid.

It is Mandatory that the cable be ran in a PVC conduit using PVC watertight fittings, junction box etc. for the first 2 to 3 feet from the Sensor. If the Sensor is mounted to metallic pipe, fittings or bracket the meter may not work !!

The cable running from the junction box to the electronics must run in a metal conduit for lengths greater than 50 feet. This conduit must be committed only to this cable. Running any other cables in this conduit will very likely interfere with the meters operation.

Mount the Sensor with the supplied PVC Union Joint over the prescribed measuring point in the tank or wet well using Control Electronics PVC Sensor Mounting Bracket (optional) or a Sensor mounting bracket of your own construction. Be sure the Sensor mounting bracket is made from PVC, not metal, and is plumb and secure. Make certain that the elevation of the Sensor allows for at least a 12.0" DEAD BAND (12.0" above maximum liquid surface anticipated plus at least another 2 inches (recommended)). DO NOT over tighten the Sensor to the bracket. This could cause extended Sensor ring-time that may interfere with the ECHO return signal.

3. ELECTRICAL CONNECTIONS



Note: Relays and RS-232 Output are not available on the ERS-560DX

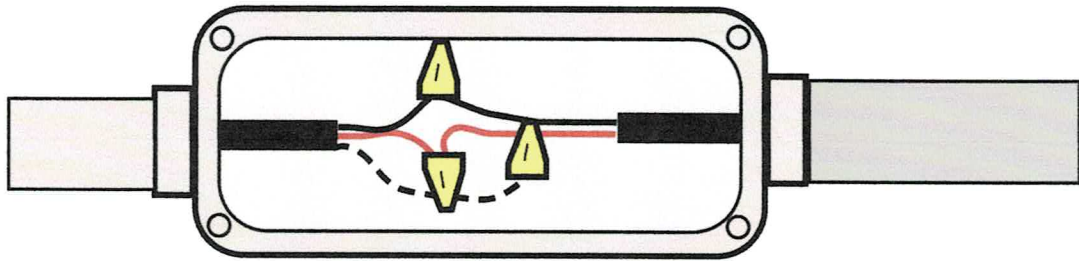
Figure 3.

SENSOR CABLE

The standard US70TC Sensor is supplied with a 30 foot interconnecting cable (unless ordered otherwise). You can splice additional cable length using wire nuts and electrical tape, but be sure to keep it as short as possible (maximum 600 feet) using only specified cable (Belden# 8451 twisted pair shielded or equal). Any splices should be made in a watertight junction box. Avoid close proximity to AC power lines and other frequency carrying lines. Run the Sensor cable through its own committed, watertight conduit. No other cables should be allowed to run in the same conduit. The Sensor cable MUST enter through the bottom side of the controller enclosure.

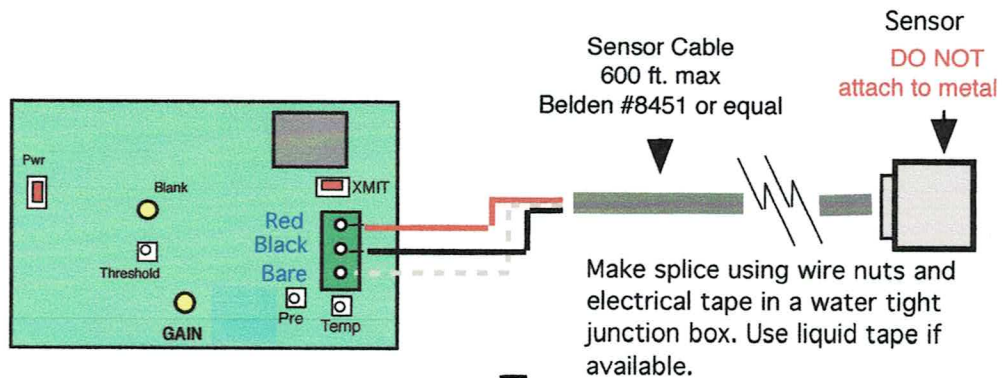
IMPORTANT

Be certain to make a good water tight entrance with the conduit to maintain the NEMA 4X rating. The conduit should be plugged with electricians putty or caulking to prevent moisture / vapors migrating from the Sensor to the enclosure. This will help to prevent condensation forming in the conduit and enclosure.



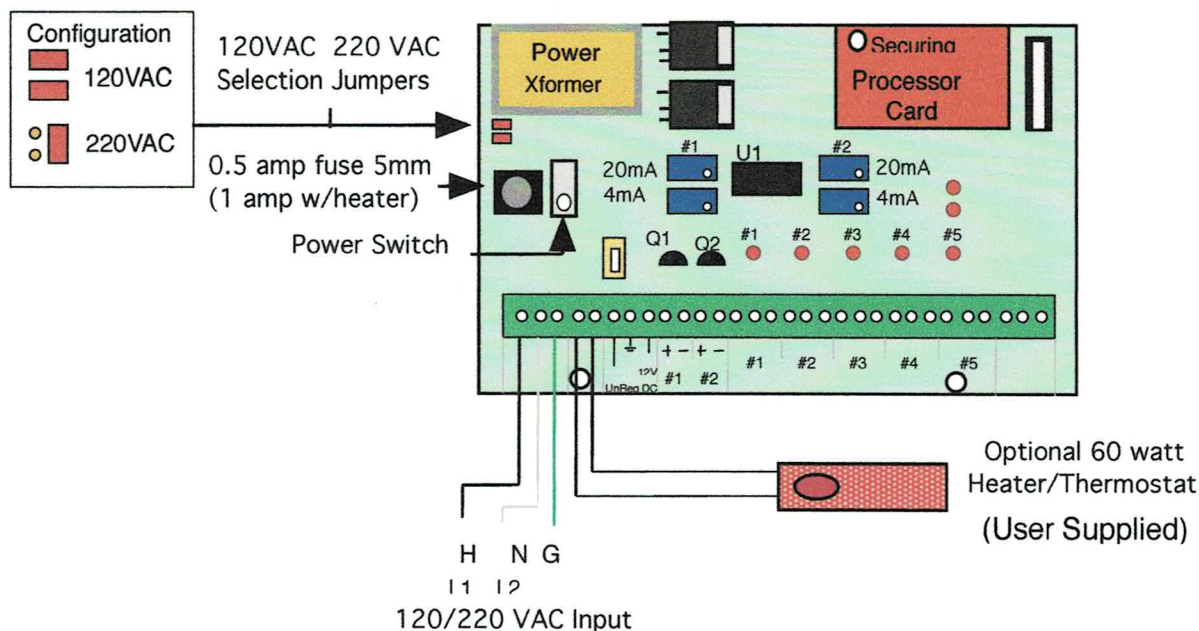
Typical Sensor Cable splicing using wire nuts in a water tight junction box.
Use liquid tape on exposed wires if available.

Connect the Sensors cable to the Three (3) pin terminal barrier strip on PC-548 Level card marked SENSOR. The Red wire to RED, Black to BLACK and bare (ground return) to BARE.
Cable type: Belden #8451 or equal - twisted pair shielded.



Sensor Cable Connection to PC-548

POWER CONNECTIONS



120/220 VAC INPUT

120 VAC power (220 VAC Selectable) **MUST** enter through the bottom side of the enclosure in its own committed conduit (not required if supplied with optional AC power cord). Connect AC power to the terminal barrier strip marked AC INPUT. DO NOT allow the AC wires to lay all about in the enclosure. Keep as short as possible to avoid AC interference. 14 gauge wire is preferred over a heavier wire that may put unnecessary stress on the terminal barrier strip. Fuse power line if needed so as not to exceed wire capacity. The flowmeter has an on board 0.5 amp fuse (1 amp with user supplied heater).

AC OUT / HEATER-THERMOSTAT

Provides AC power to control an external recorder or optional 60 watt Heater/Thermostat (user supplied) that operate in conjunction with the level monitor. Power is applied by ON/OFF switch.

NOTE: The unit has a .5 amp 5mm fuse, 1 amp with heater. It may be necessary to increase the fuse rating to accommodate external devices. Max rating should not exceed 3 amps.

UNREG DC, $\frac{\ominus}{\oplus}$ (ground) , 12 VDC (Bat), 24 VDC

These inputs/outputs provide DC power for optional accessories or allow for battery only operation of the meter. UNREG DC is both an input and an output. When AC power is applied, an unregulated voltage of approximately 16~18 VDC will be found at this point between UNREG DC and GROUND ($\frac{\oplus}{\ominus}$) and 12 VDC between 12VDC and GROUND.

24 VDC is available between '+' of the 4-20mA output and ground ($\frac{\oplus}{\ominus}$). This may be used to power customer options. Max current draw should not exceed 150 mA. The 4-20 mA fuse (opt.) should be increased to 250 mA or 1/4 amp. when using 24 VDC for external options.

BATTERY OPERATION

BATTERY ONLY OPERATION

If the meter is going to operate from a battery only (no AC power), a standard 12 volt gel cell battery may be connected between 12VDC and Ground on the terminal barrier. The plus '+' of battery to 12VDC and the negative '-' to GROUND (⊥). A minimal 6 amp hour battery is recommended .. max run time approx. 30 Hr.

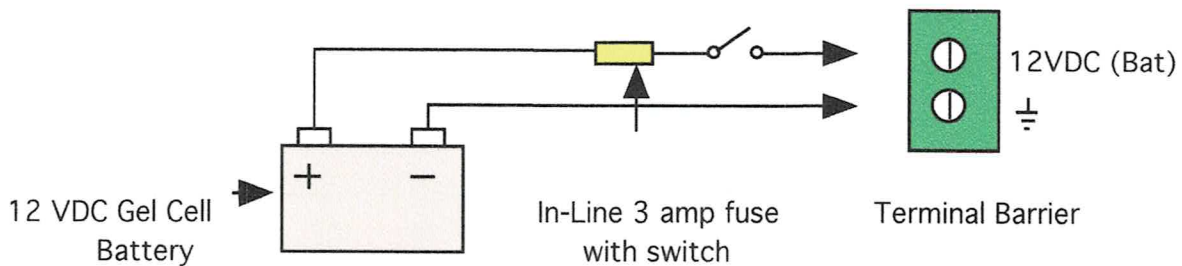
BATTERY BACK-UP OPERATION

If battery back-up is desired to maintain operation of the meter in the event of a power failure, we recommend the use of a UPS (uninterruptible power supply).

NOTE: battery back-up is not required to retain the programming.

IMPORTANT

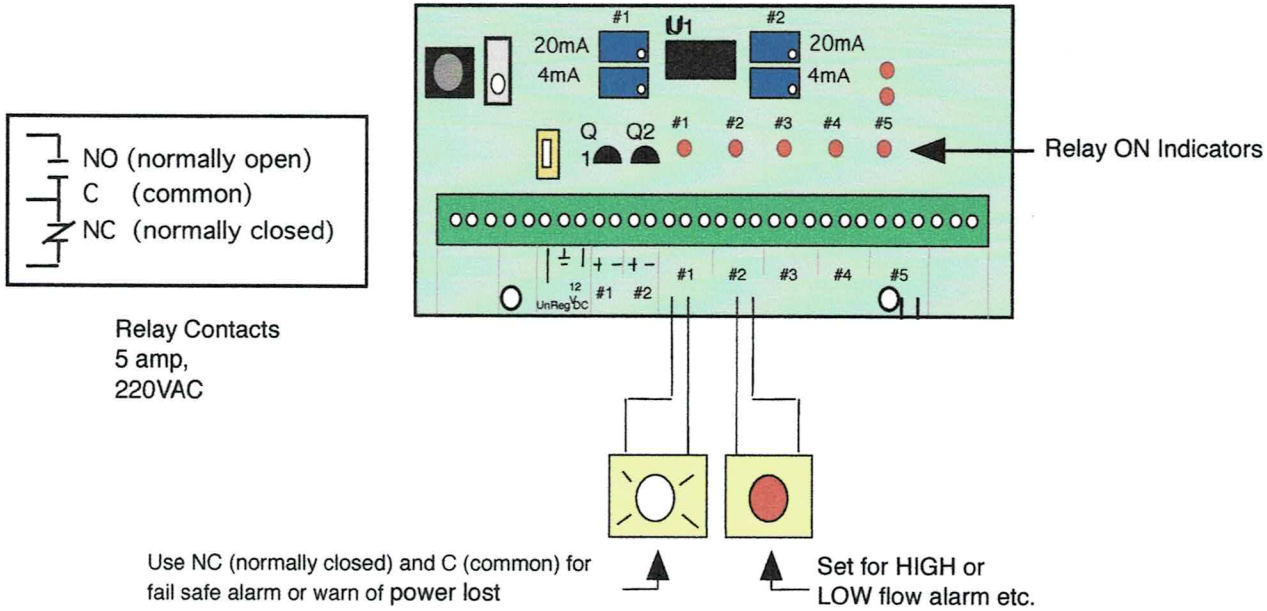
The power switch on the circuit board does not switch the battery supply nor does the fuse offer any protection. Power is applied as soon as the battery is connected to the terminal barrier. We recommend you install a switch and an in-line 3 amp fuse for protection if no on-board fuse is provided for battery.



Battery Operation Only connections

Note: If using 12VDC operation, you must connect '+' lead of 4-20 mA loop to 12VDC.

RELAY OUTPUTS



Note: ERS-560 does not have Relay Outputs

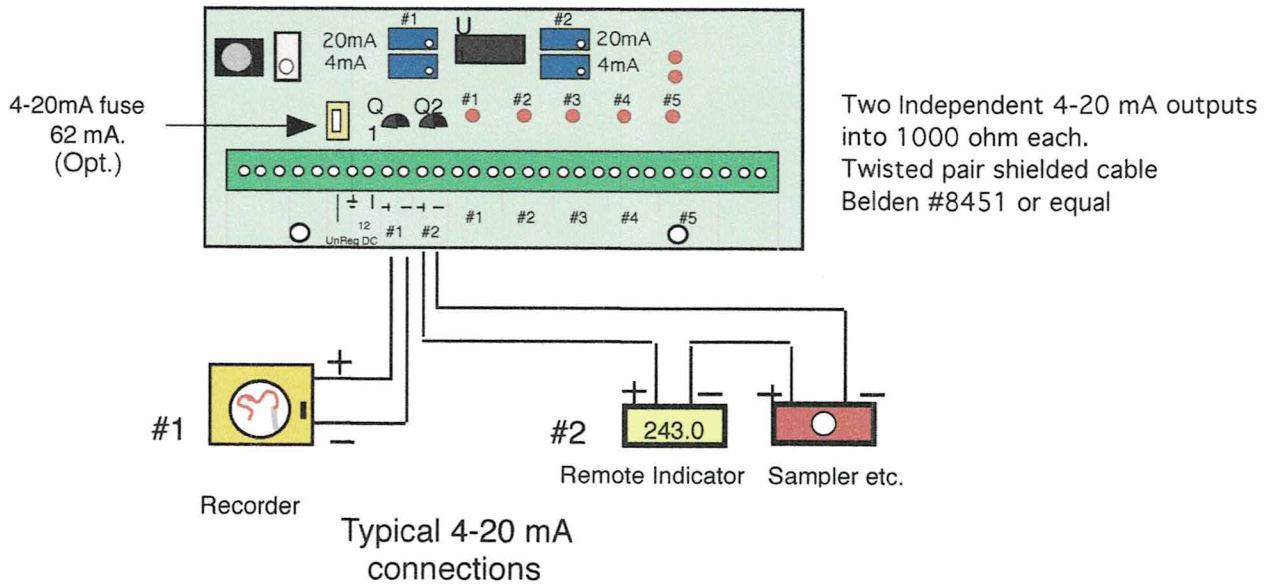
RELAY outputs (N/A On 560DX)

Relay #1 thru #5 are independently programmable alarm set-points used for alarming and control. Both the ON and OFF settings are programmable allowing for pump UP or DOWN control, valve control etc. They are 5 amp, 220 VAC contacts with associated LED status indicators on circuit board. Use wire suitable for electrical load to be carried by contacts. Fuse line if needed so as not to exceed contact rating.

ZERO METER input

A dry contact closure across ZERO METER input will force the meter to go to a preprogrammed percentage of level value as entered by the operator (ON ECHO LOSS GO TO in program section). This will also display ECHO LOSS warning.

4-20 mA OUTPUTS



There are two independent 4-20mA. outputs, individually adjustable. They are used to control samplers, set-point controls, recorders, chlorinators etc. The two analog output signals are FLOATING outputs (both the '+' and '-' terminals have their potential above system ground) and are DC isolated from electrical ground. The signal outputs are connected as shown. Polarity must be observed through the entire control loop for proper operation. Maximum loop resistance for each output is 1000 ohms. Twisted pair shielded wire should be used, Belden #8451 or equal. Ground wire (bare wire) may be connected to ground (≡) on the terminal barrier or remote device. Make connection only at one end.

- Notes:
- 1] the 4-20 mA output is fused (optional). Fuse is rated for 62 mA. Do not exceed 250 mA.
 - 2] If 12VDC battery operation only is used, you must connect the '+' lead on the 4-20 mA loop to '+' 12V. Max loop resistance will be reduced to 500 ohm.
 - 3] Outputs are in percent of level. See 'SETTING THE 4-20 mA OUTPUT'.

REPLACING THE CLOCK / MEMORY BATTERY

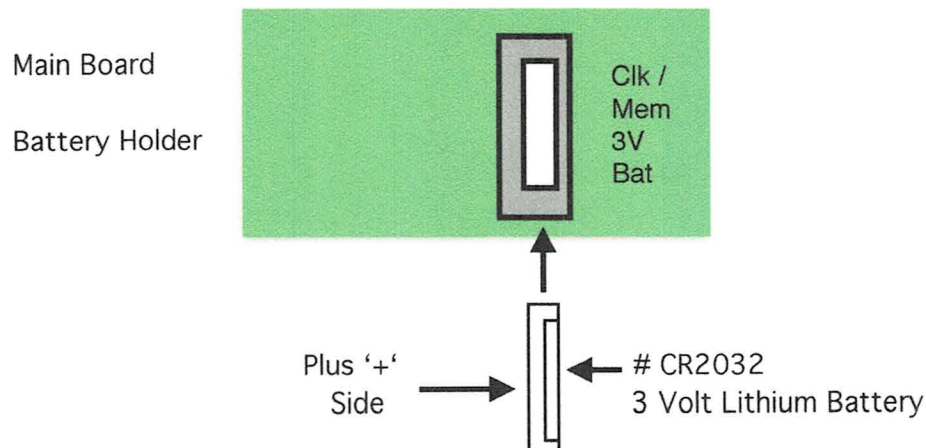
This battery is for retaining programmed information and keeping the clock running when power is turned OFF. The battery should last for approximately 8 to 10 years under normal operation. You may replace the battery when power is 'ON' by pulling the battery out of its holder and replacing it with a '#CR2025' or 'CR2032' (recommended) 3 volt lithium coin battery or equal.

WARNING!!

If battery is removed when power is 'OFF', all programming and clock / date will be lost. You will need to restart the system as described in the Programming Flowchart in this manual by using the 'SHIFT' button to RESET the meter to defaults and then reprogram. **Replace the battery only when power is ON.**

WARNING!

Install Battery Observing Correct Polarity.

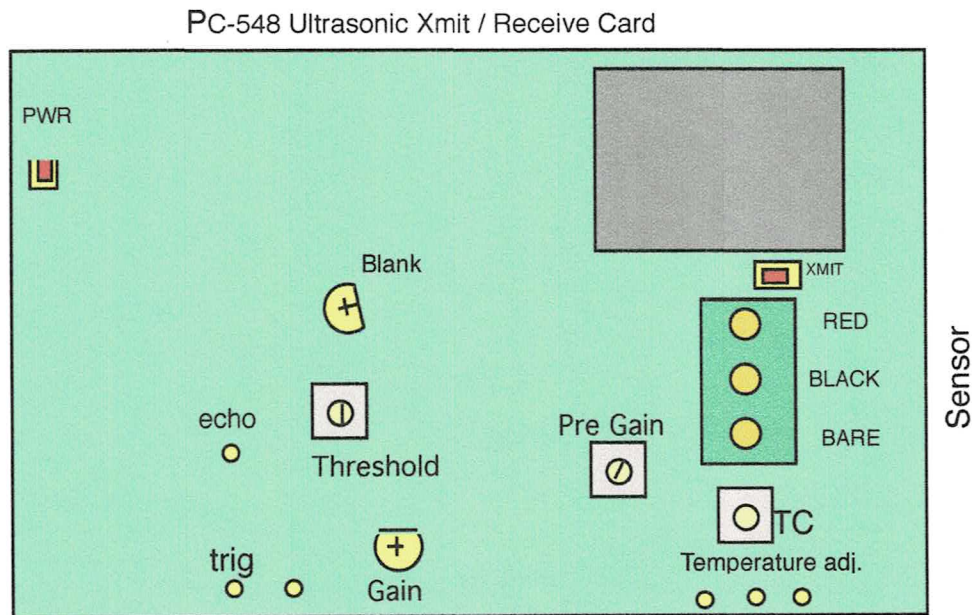


4. ADJUSTMENTS AND CONTROLS

There are very few adjustments that can be made on the ERS-560 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.

Please note: The following adjustments/calibrations are factory set and should not be touched unless authorized by service technician from Control electronics.

Ultrasonic Transmitter / Receiver Card Refer to Figure 4



Adjustments shown in their NORMAL position

Figure 4.

GAIN

The gain has been factory set. Normally the GAIN setting does not need to be adjusted. Typical adjustment is set to one half of its turn. If adjustment needs to be made, first make certain that the Sensor is plumb to the level surface (see SENSOR INSTALLATION). Too much or too little GAIN may cause the unit to respond to unwanted noise or cause loss of signal. Do Not mistaken Sensor mounting problems for electrical noise problems. Always check your installation first before making any adjustments.

PRE GAIN

Factory set and should not be touched. CW increases GAIN.

THRESHOLD

The THRESHOLD is factory set. Full CW or CCW will cause loss of signal. Increasing (CW) the THRESHOLD may help in rejecting unwanted electrical noise. If the meter appears erratic, try increasing the THRESHOLD.

Note: changes to the GAIN or THRESHOLD setting may effect the apparent calibration. You may need to offset the calibration under MISC Settings mode RANGE = xxx.xx Cal Factor = 1.000 in the programming.

BLANK

This setting BLANKS the transmit pulse and ringing in the sensor - Factory Set. Caution: too much blanking may cause close echo signals (12 to 16 inches from sensor) to be blanked and not processed. NOTE: BLANKING is also automatically set in the programming BLANK = ZERO setting - SPAN

XMIT LED

The XMIT LED indicates a pulse has been sent to the sensor. This should pulse the same time the RUNNING LED pulses on the main circuit board.

TC (Temp Cal)

The TC adjustment is used to calibrate the temperature input from the Temp Probe (Factory Set).

Main Circuit Board (Refer to Figure 3)

ON/OFF Switch

Applies AC power to the circuit board and AC out to the AC OUT on the terminal barrier.

Note: this switch does not control battery power if connected.

120/220 VAC

Install or remove appropriate jumper(s) to change operating voltage to 120 or 220 VAC operation.

Note: this is factory set. Jumpers are located under left-bottom corner of power transformer.

4 and 20 mA

The 4 and 20 mA adjustments are used to set the 4-20 mA output. See SETTING THE 4-20 MA OUTPUTS.

Note: 4-20 mA adjustments have been factory set and should not require any adjustment.

LED's 1 thru 5 (N/A ERS-560DX)

These LED lights will light when associated relay is energized.

RUNNING LED

Each time the system makes a measurement, this LED will flash. Typical rate is 4 times per second. This is considered normal operation and should be flashing steadily.

Note: when downloading data log, this LED will appear erratic.

NO SIGNAL LED

This LED will turn 'ON' when no ECHO signal is received. The LED will flash erratically under turbulent conditions or a misaligned sensor mounting. This is normal. The percent of ON/OFF will be an indication of signal strength. If the ECHO signal return is lost (LED ON) for at least 12 continuous seconds, a warning will be displayed. See troubleshooting guide in back of manual.

STARTING UP THE LEVEL MONITOR

Once all installation procedures have been completed, the ERS-560 Level Monitor is ready to be powered up. But before doing so, it is advisable that you go back and check your installation to ...

Before Applying Power Quick Check List

- 1] confirm that all wire connections are correct and secure, particularly the AC power input with correct circuit breaker size.
- 2] confirm that the sensor has been installed properly using the correct type of cable (Belden# 8451 or equal) and any splices made to the sensor cable are correct, secure and moisture tight (use liquid tape, available at most electrical and hardware stores).
- 3] make sure all conduit entrances to the enclosure are watertight. Use electricians putty to plug conduits to prevent condensation and gases migrating to enclosure.
- 4] measure the distance from the sensor face to the zero level point (0%). You will need this value in inches when programming.

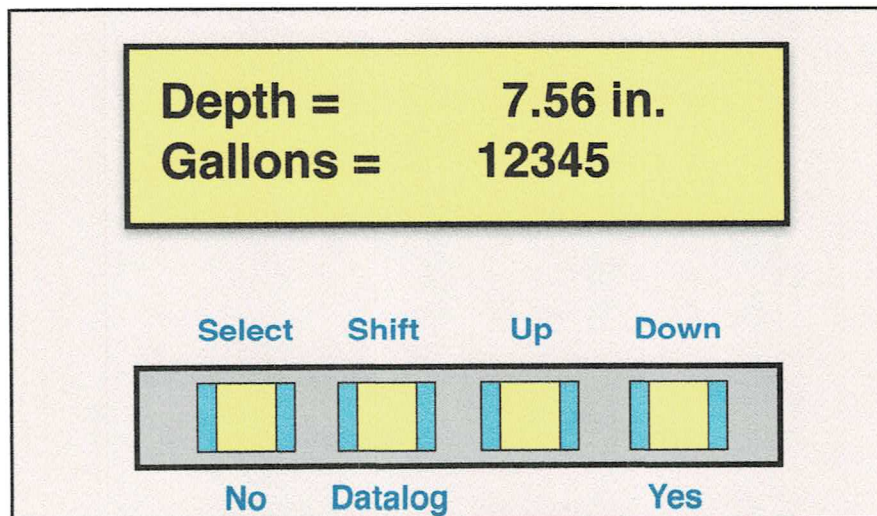
You are now ready to power up the meter.

TURNING POWER ON

Turn AC power Circuit Breaker ON back at the electrical panel if needed. Switch the POWER ON to the meter by switching the small toggle switch on the lower left of the main circuit board to ON.

Once power is applied, the meter will power up and display a few banners indicating manufacturer and software revision number. Before shipping, the meter was set to factory defaults and should now display DEPTH and GALLONS.

INITIAL RUN MODE DISPLAY AND KEYPAD LAYOUT



Note: The values displayed will most likely be incorrect at this time, possibly showing a negative depth. This is normal. The meter has not yet been set up to your application.

Wait approximately 15 seconds to make sure the meter does not display any warnings with respect to ECHO signal or TEMPERATURE. If warnings are displayed, check wiring and see troubleshooting guide in back of manual.

The meter is now operating. The 'RUNNING' LED light on the main circuit board should be flashing (approx. 4 times per second) and the 'NO SIGNAL' LED should be OFF or intermittent if level is turbulent. Some relays may energize (N/A on ERS-560DX), depending on the default settings.

Processes used in ECHO Signal Recovery refer to PROGRAMMING FLOW CHART #3 in manual

BLANKING

The Ultrasonic Transmit / Receive card has been factory set for best response. The cards BLANKING has been set to minimize any affects the transmit pulse may have on the received ECHO. The software (programming) also calculates a BLANK time to ignore any ringing from the sensor or other interfering signal after the sensor has been pulsed. The BLANK time (or distance) is equal to: $BLANKING = ZERO \text{ distance setting} - SPAN \text{ setting}$ in the programming. i.e. if ZERO is set to 31.0" and SPAN to 15.0" then the BLANKING distance = 31.0" - 15.0" or 16.0".

If the systems seems to be responding to ring time signals (i.e.: indicates max level or intermittent spiking), increase the ZERO distance and reset the SPAN for a longer BLANKING or adjust the BLANK on card slightly CW.

AVERAGE READINGS

AVERAGE READINGS increases the readability and stability of level indications. The meter will make a number of measurements as programmed in AVERAGE READINGS (best setting is 10) and average the measurements before displaying. An average of 4 equals approximately 1 second before updating the display. Average of 8, approximately 2 seconds and so on.

DAMP FACTOR

DAMP FACTOR dampens the displayed values for smoother response of level indications. i.e.: the higher the damp factor, the slower the measured value displayed will change from one reading to the updated reading. Damp Factor is 00 to 10, Ten is max.

Note: if levels (echo) change quickly but stay within a small range (i.e. turbulent) you may increase the damp factor for best display of values. Typically a damp factor of 3 is recommended.

PROGRAMMING THE METER

You can now begin programming the meter once the STARTUP procedure above has been completed successfully. The keypad on the front panel is used for selecting the various RUN MODE indications and PROGRAMMING MODES of the meter.

- 1] Use the SELECT button to scroll through the program selections, selecting NO/YES where needed.
- 2] To change any value, use the SHIFT button. This moves the cursor ('_') under the digit you want to change.
- 3] Use the UP and DOWN buttons to change the value of the selected digit.

When in the RUN MODE, press the UP or DOWN button to display the RUN MODE parameter you desire. The 4-20 mA. output is not affected by the selection of any RUN MODE window.

RUN MODE Selections:

DEPTH INCHES ... GALLONS

DEPTH indicates the measured level of liquid and displayed in INCHES and GALLONS in tank / well. See PROGRAM FLOW CHART #3 in manual.

DEPTH FEET ... GALLONS

DEPTH indicates the measured level of liquid and displayed in FEET and GALLONS.

Note: if the level drops below the ZERO setting programmed, the DEPTH will be displayed as a negative number.

i.e. DEPTH = - 2.34" (means 2.34" below the programmed ZERO point).

4-20mA ... TEMPERATURE

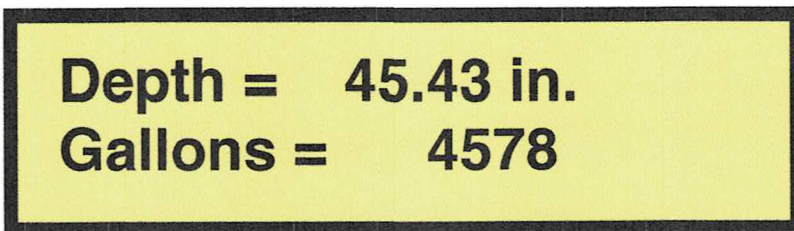
Indicates the percent of level as found on the 4-20 mA. OUTPUT #1. The outputs are scaled by the SCALE 20 mA. OUTPUT #1 / #2 under the SET LEVEL / 4-20 mA mode in programming.

The temperature at the Sensor is also indicated. The temperature is in degree fahrenheit $\pm 3^\circ$. The meter must have a temperature reading to do calculations. If the probe is damaged or not used, you must manually turn the probe 'OFF' and enter a temperature under MISC Settings ... Temp Probe ON / OFF. If the Temperature Probe is 'ON' and the system senses a probe failure, the meter will automatically use the default temperature entered if you select Temperature Probe is OFF. Factory default temperature is 60° F. A TEMP PROBE failure warning will be displayed. Note: Temperature may indicate as much as 10° warmer than the ambient air if the sun is shining directly on the sensor.

LEVEL ... LITERS

Indicates LEVEL in meters and volume in LITERS.

Indicates DEPTH in inches and volume in GALLONS



Depth = 45.43 in.
Gallons = 4578

note: DEPTH will show a minus sign (-) if the LEVEL is below the ZERO setting.

TYPICAL RUN DISPLAY

BEGIN PROGRAMMING

The programming of the flowmeter is accomplished by first pressing the SELECT button. You will be asked if you want to GO TO PROGRAM MODE? If you select YES you will be asked to ENTER YOUR PASS CODE. Enter the PASS CODE using the SHIFT , UP and DOWN buttons . If the wrong PASS CODE is entered, the display will return to the RUN MODE last selected.

Note: The meter leaves the factory with pass code '0000'.

Press the SELECT button again. You are now asked CHANGE PASS CODE?. If you like, you may change the pass code at this time by using the SHIFT, UP and DOWN buttons. If you change the pass code

Remember your new PASS CODE !!!

If you forget your pass code and cannot enter the programming section, you will need to call the factory at 610-942-3190. Please have your meters serial number available. It is found on the upper left corner of the main circuit board.

Press the SELECT button and you will be asked Set Level / 4-20mA. Press YES to enter section. Press the SELECT button to scroll down the list. Use the SHIFT/UP/DOWN buttons to change any values. You must enter a ZERO LEVEL DISTANCE in inches.

Note: If the ZERO FLOW DISTANCE value is changed, the SPAN will automatically set itself according to $SPAN = ZERO DISTANCE \text{ setting less } 12.0"$. You may change the SPAN to any value that is less then the value displayed. Minimum SPAN is 1.00".

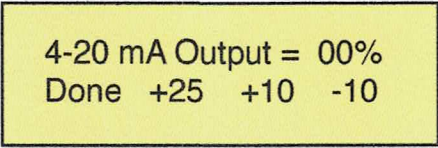
You should set the SPAN for max depth anticipated plus 1 to 2 inches for best operation. Maintain at least 12" dead band.

Continue down the list referring to the PROGRAM FLOW CHART in this manual. A brief explanation of each parameter is given in the programming flow chart.

SETTING/TESTING ... 4-20mA OUTPUTS

TESTING

There are two (2) 4-20 mA. outputs on the ERS-560 meter that can be set independently and tested using the TEST 4-20mA OUTPUT? function under MISC MODE. Enter the TEST 4-20mA OUTPUT by selecting 'YES'. The 4-20mA outputs should go to 4 mA. or 0%. The display will read ...



4-20 mA Output = 00%
Done +25 +10 -10

- 1] Adjust the '4 mA.' adjustment of output #1 and #2 (see figure 3, page 8) for 4 mA. output. (Note: perform the 4 mA. adjustment first to eliminate any interaction between the 4 and 20 mA. adjustments).
- 2] Press the SHIFT button 4 times to simulate 100% or 20mA. (short cut - press the DOWN button once).
(Note: Pressing the SHIFT button adds 25% to the output; the UP button adds 10% and the DOWN button minus 10%. By using the SHIFT, UP and DOWN buttons, you can increment and decrement the output in 5% increments).
- 3] Adjust the '20 mA.' adjustment of each output for 20 mA. output.
- 4] Repeat steps above using the Keypad to simulate an output and confirm the 4-20 mA output.
- 5] Press SELECT (Done) when completed to exit simulate of 4-20mA output.

This completes the testing of the 4-20 mA outputs.

SCALE THE 4-20 mA (found under Set Level / 4-20 mA program mode)

Set the SCALE 20 mA. OUTPUTs #1 and #2 to scale the 4-20mA outputs to a remote recorder or other device if needed. For example, the recorder charts are printed 0-200. Set the OUTPUT #1 for 000200.00. Note: Output#1 and 2 are scaled in % of Level.

Output #2 may be scaled for a different % of Level.

SET OUTPUT DAMP FACTOR

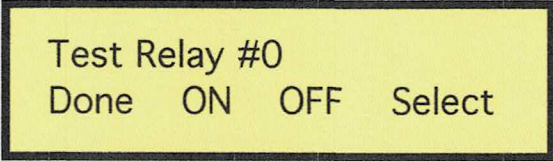
The DAMP FACTOR controls the response rate of the 4-20 mA outputs. Set the DAMP FACTOR for each of the 4-20 mA outputs by entering a value of 1 to 10 when prompted. 1 being the fastest response, 10 the slowest. A value of 3 is typical.

SETTING/TESTING RELAY OUTPUTS

(N/A on 560DX)

TESTING THE RELAY OUTPUTS

The relay outputs can be tested by going to MISC MODE in the programming. Select 'YES' at TEST RELAY OUTPUTS?. The display will show



Test Relay #0
Done ON OFF Select

- 1] Use the DOWN button to Select the relay number (1 thru 5).
- 2] Press the SHIFT button to turn the selected relay 'ON'.
- 3] Press the UP button to turn the selected relay 'OFF'.
- 4] Press the SELECT button when 'DONE'.

The associated LED will light when relay is energized.

SET RELAY OUTOUTS .. Relay 1 ~ 5

The ERS-560 has five (5) independently programmed alarm relay outputs. The programming is performed under the RELAY SETPOINTS mode. Each Relay output has a separate ON and OFF setting for differential control of pump ON and pump OFF or valve open/close etc. The program values are in inches. The relay contacts are dry contact closures rated 5 amp, 220VAC. An associated LED will light when the relay is energized.

Note: while in the program mode, the relay outputs will not be affected by any program change. Once you are back in the RUN MODE, the new values will take affect.

You can select AUTO SET ELEVATIONS to set each relay to default values based or ZERO and SPAN settings entered in the programming.

You can set relay 1 and 2 to alternate LEAD / LAG pump and also set a DELAY ON time of 1 to 99 seconds.

SETTING COMMUNICATIONS / DATA LOG

Set the RS-232 output parameters and DATA LOG sample rate and 24 hour Summary start time by selecting 'YES' at SET COMMUNICATIONS.

BAUD RATE

Set the BAUD RATE to desired setting by pressing the UP or DOWN button. Rates are 2400, 9600 or 19200. Make sure the selection matches the device connected to the RS-232 output.

DESTINATION

Set SEND DATA TO... PRINTER, PC/LAP TOP, MODEM 1 (LUCENT) or MODEM 2 (CONEX) by pressing the UP or DOWN button. This is only necessary if using an external serial printer or modem.

ID NUMBER

Set the meters ID# if desired. LV-0000 is default. Use the SHIFT, UP and DOWN buttons to set.

COM ADDRESS

Set COM (communication) ADDRESS. The default is 'A'. Select the '#' sign if using a modem. Note: if modem is selected above, the '#' sign will automatically be set. When using a modem, you can change the COM ADDRESS to other value except 'A', 'N' or 'Y'. These are reserved. The COM ADDRESS will be used when downloading data to a PC/Lap Top.

24 HOUR SUMMARY

Set the time to begin the 24 hour summary data logging.

DATA LOG SAMPLE RATE

Sets the SAMPLE RATE for Data Logging. i.e., entering 30 minutes indicates that every 30 minutes the LEVEL for the past 30 minutes will be averaged, logged and time stamped. If you set to '00' minutes, the data logging will be disabled. The Data can only be viewed by downloading to a PC/Lap Top.

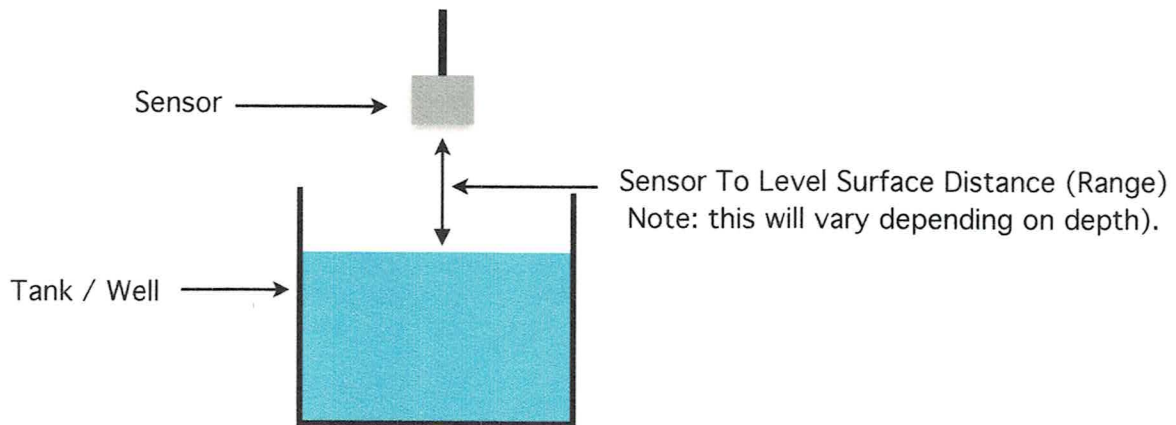
Note: this setting does not affect the 24 hour summary logging.

MISC SETTINGS

CHANGING THE CALIBRATION REFERENCE

Make a measurement from the Sensors face to the surface of the Level. Go to MISC Settings.... mode in the meter and check the RANGE = display value. This is the actual measurement the meter is making. If the distance is not correct, use the SHIFT, UP and DOWN buttons to change the CAL FACTOR value (default is 1.000).

i.e. if the displayed value is found to be 2% low, enter a CAL FACTOR of 1.020 to increase value by 2%. If the displayed value is 1.5% high, enter a CAL FACTOR of 0.985 (i.e. $1.000 - 0.015 = 0.985$). Changing the CAL FACTOR alters the microsecond reference used in the distance calculation to compensate for installation anomalies, sensor tolerances, atmosphere conditions etc. DO NOT attempt to correct flow indication unless you are absolutely certain that the instrument is incorrect.



Actual measurement made by level meter

<p>Range = 018.63 in. Cal Factor = 1.000</p>
--

Calibration Factor - change value if needed.

Note: Be sure the Sensor has been installed properly over the Level Surface (see sensor installation), programmed data is correct, Temperature Reading is correct, all cables have been properly connected and your physical measurement is correct before making any CAL FACTOR change.

SETTING THE TIME AND DATE (N/A on 560DX)

Under the MISC Settings Set the Time and Date using the SHIFT, UP and DOWN buttons. The Data Logging and 24 hour Summary use the time/date for logging purposes. The time/date is generally set when it leaves the factory but should be checked.

RESET THE EVENT LIST and DATA LOG (N/A on 560DX)

Under the MISC Settings you can RESET (clear) the Event List and Data Log by selecting 'YES' when asked. It is best to do the RESET(s) when starting up the meter or when the Time/Date has been changed.

Note: The EVENT LIST is not Reset by the Data Log RESET.

TEST 4-20 mA and RELAY OUTPUTS

See SETTING 4-20 mA and RELAY OUTPUTS.

TEMP PROBE ON/OFF

Under the MISC Settings you can disable (turn OFF) the temperature probe and enter a manual temperature for the meter to use. This may be necessary to do if your temperature probe is defective.

If the meter detects a defective or disconnected temperature probe, it will automatically use the entered manual temperature. This is considered the default temperature. You can enter a default temperature and still use the temperature probe by

- 1] Go to TEMP PROBE ON/OFF and press the UP or DOWN button until the meter displays Temp Probe is 'OFF'.
- 2] Press SELECT button. You will be asked to ENTER OUTSIDE TEMP.
- 3] Use the SHIFT, UP and DOWN buttons to enter a temperature. This is also the meters new default temperature.

Note: you can enter something other than the actual temperature (default temp). Enter the actual temperature only when the temperature probe is defective and/or you are not going to use the temperature probe.

- 4] Press the SELECT button to exit.
- 5] Leave Temp Probe OFF if the temperature probe is defective or you are not using the probe. The flowmeter will use the default temperature you just entered.

- OR -

Press the UP or DOWN button to select Temp Probe is 'ON'.

The meter will use the temperature probe. If the probe fails or is defective, the meter will automatically use the default temperature entered and display a warning.

If the warning is displayed and you can not immediately correct the problem, return to this section and select TEMP PROBE is OFF until the problem is corrected, at which time you would return and select TEMP PROBE is ON

Data Logging (N/A on 560DX)

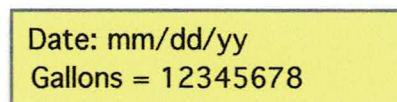
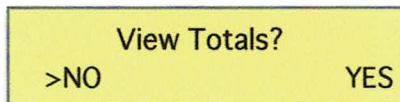
The ERS-560 meter continuously logs data as measurements are being made. Once memory is filled, old data will be written over by new data (auto wrap around). The meter has three (3) independent data log types. They are 1] a 24 hour flow summary; 2] discrete levels and 3] an event list. All data log may be downloaded to a PC/Lap Top for viewing using the RS-232 output (see using the RS-232 output). The 24 hour summary may be directly printed to a serial printer connected to the RS-232 output either on demand or set for AUTO print (printer is user supplied).

24 Hour Summary

The 24 HOUR SUMMARY data log keeps track of the MIN and MAX level in inches with time stamp, the level in inches and total gallons stored at the end of the 24 hour period for each of the past 200 days. The START time for the 24 hour period may be set by the operator under SET COMMUNICATIONS section in the programming. The default setting is 12:00 midnight. The START time begins a new summary page with date and times. To view the 24 Hour Summary it is best to download the data to a PC/Lap Top computer using the RS-232 output. You will be able to select up to 6 months of data, pre-formatted for quick viewing and print out. (see using the RS-232 output for download instructions).

Viewing Daily Totals At The Meter

The daily totals (gallons stored) can be found in the 24 Hour Summary described above or viewed at the meter by pressing the SHIFT (DataLog) button while in the Run Mode. You will be asked View Totals?... Press YES. The Date and Total gallons stored for that date will be displayed. (Note: the meter will always begin with today's date. Today's date will show total gallons stored for the day, not total gallons used). Press the UP or DOWN button to select the next or previous date; the SHIFT button to go back 1 week. Press the SELECT button while viewing the TOTAL to EXIT the Data Log section.



Print Daily Readings (using Serial Printer, User Supplied)

If NO is selected in VIEW TOTALS?, you will then be asked Print Daily Readings? If NO, you will return to the Run Mode. If YES, you can select ...

Print NOW. You will enter number of days to print (up to 200). Press Select to begin printing to your serial printer. (Note: the meter sends one data line to the printer and waits approximately 2 seconds for the printer (user supplied) to print before sending the next line.

Print AUTO. The meter will display the time the 24 Hour Summary will print each day. (Note: this time is set under Set Communications.... Make sure your printer is turned ON). When the 24 hour period ends, data will be sent to the printer and a new 24 hour summary will begin.

Discrete Data Levels

The meter logs the level in inches every 1 to 99 minutes as set by DATA LOG SAMPLE RATE under SET COMMUNICATIONS. The level will be time stamped. This data can be downloaded to a PC/LAP TOP using the RS-232 output.

Event List

The Event List logs the date, time and event type when it happens. Events types are ...

- 1] Power applied, System Restart
- 2] Master Reset / Startup
- 3] Entered Programming
- 4] Echo Signal Lost
- 5] Echo Signal Returned
- 6] Temperature Error
- 7] Relay #x ON
- 8] Relay #x OFF
- 9] Reset Event List
- 10] Reset Data Log

The Events may be viewed by downloading to a PC/Lap Top using the RS-232 output.

Resetting The Data Log

The Data Log and/or the Event List may be RESET (clear all data) by selecting YES when asked Reset The Data Log? or Event List under Misc Settings.

Resetting The Meter

If the SELECT button is held when power is applied to the meter, then released, the user will have access to the meters reset function. The meter will display manufacture, model, type meter and software revision number (Rv).

The user may reset the meter by selecting YES to FACTORY DEFAULTS when prompted. The operator must now proceed to reprogramming the meter.

Note: This reset will set the pass code to '0000'.

The Resets can help recover from a processor crash or lockup due to lightning etc. The resets do not affect the data log. The user may proceed to resetting the data log in the PROGRAMMING section.

If The Meter Should Lockup 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 meter to crash or lockup. 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 THE METER.

In extreme cases, it may be necessary to do a HARD Reset by first turning power OFF to the meter and then removing the 3 volt clock/memory coin battery from its holder for about 1 minute. This will cause a loss of all data, including data logging.

Reinstall the coin battery (note polarity) and do a power up reset using the SELECT button as mentioned above. Proceed to programming the meter. Set the clock and date and RESET the data log and event list when and if asked.

Using The ERS-560 PROGRAMMING FLOWCHART

OPERATING INSTRUCTIONS

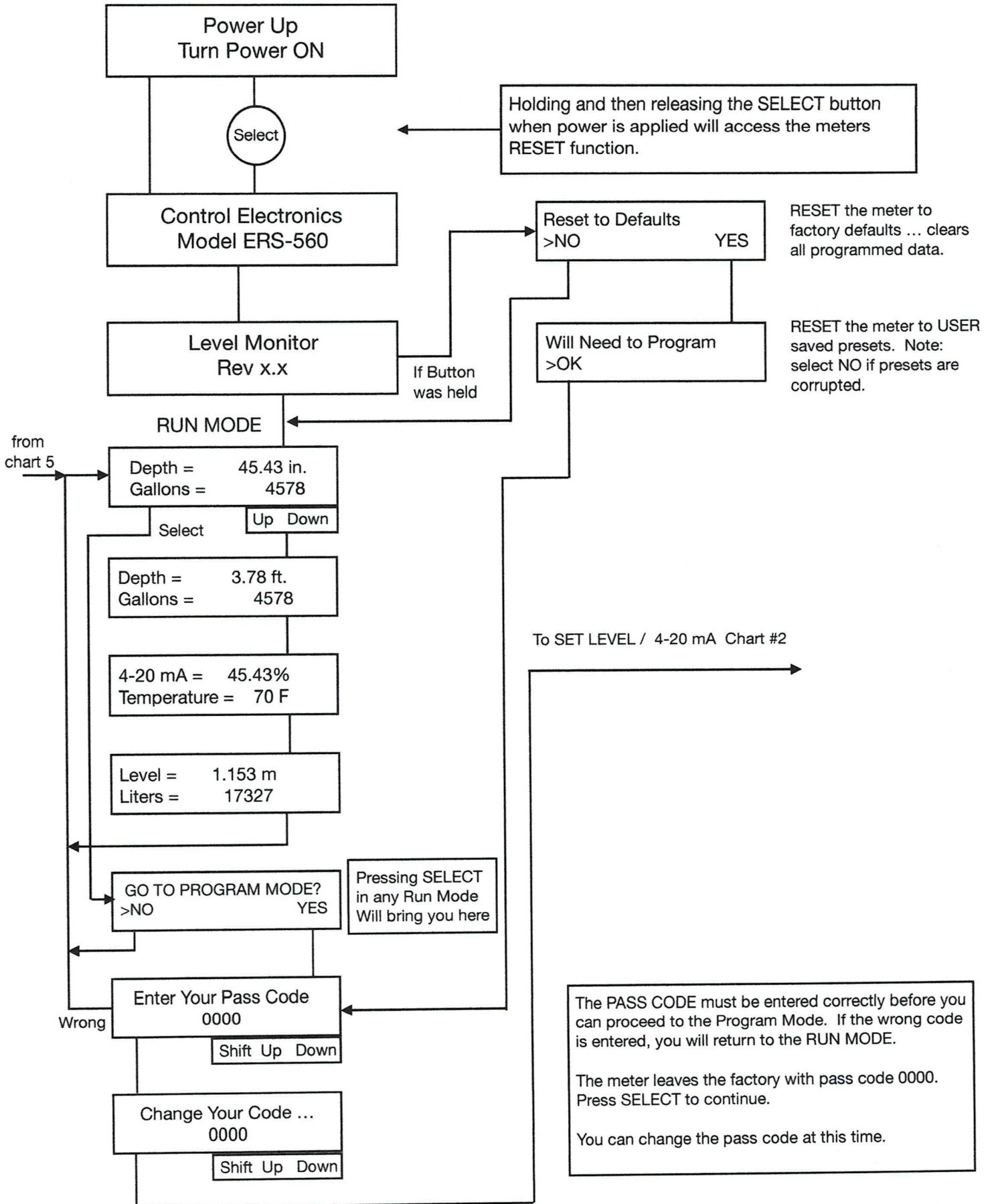
When power is first applied, the ERS-560 meter will run through its POWER-UP windows. It should display 2 windows indicating name of manufacturer, model number, type of meter and the software revision number. The process takes a few seconds and will then enter the RUN MODE. The meter will display the window that was ON (selected) prior to turning power 'OFF'. To select or scroll through the RUN MODES, use the UP/DOWN buttons. Each press of the 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. The meter begins monitoring level automatically.

To enter the PROGRAM MODE, press the SELECT button. You will be 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.

REMEMBER YOUR PASS CODE!!!

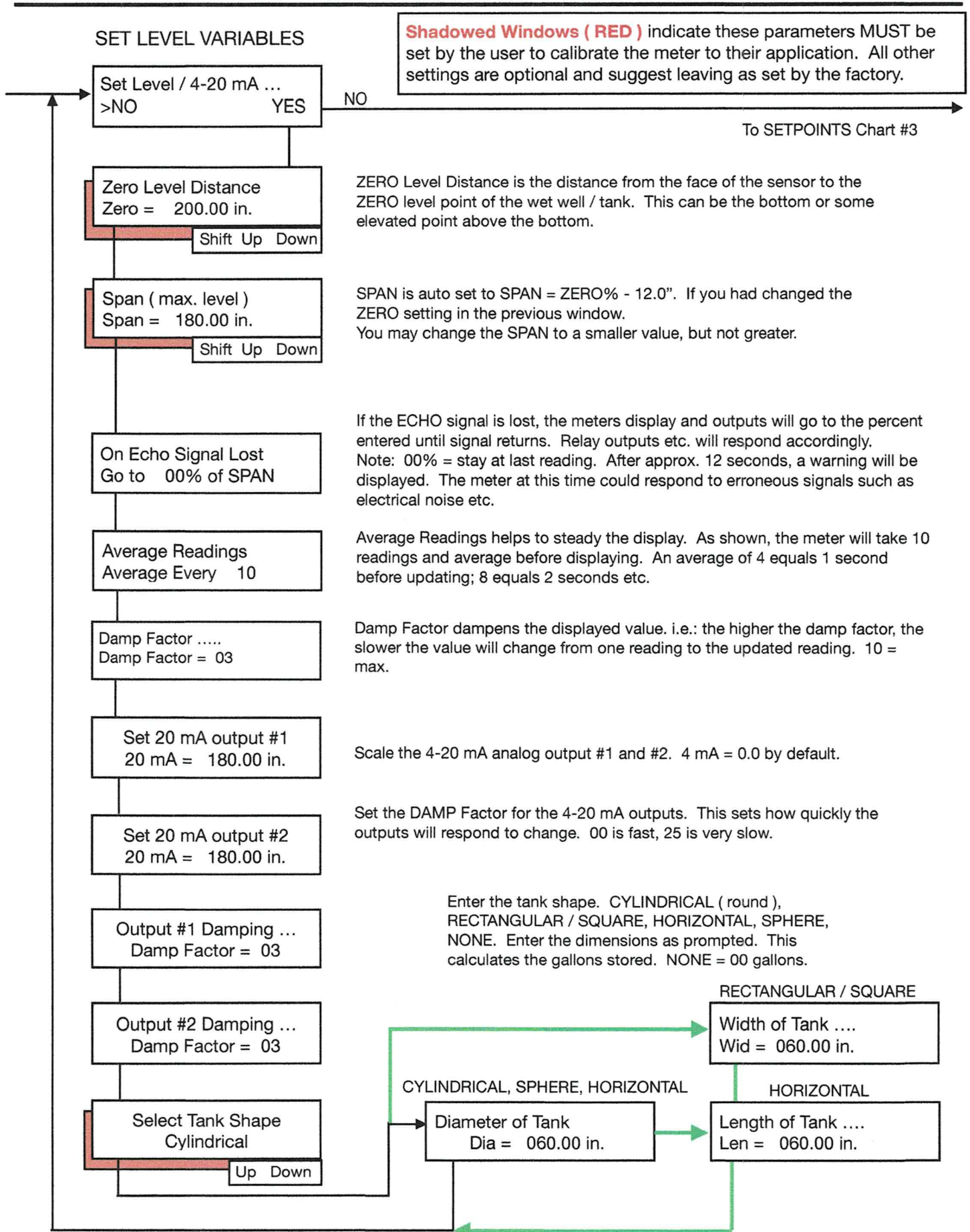
Once you entered the PROGRAM MODE you can scroll through it by pressing the SELECT button. The SELECT button performs three functions: 1] NO, 2] ENTER and 3] NEXT WINDOW. Use the SHIFT, UP and DOWN buttons to change the values in each window as needed. The DOWN button is used to select YES when data values are not displayed. The Programming Flowchart will guide you through the many features and functions available to you. A brief explanation for each window/function is provided in the flowchart.

ERS-560 Level Meter Program Flowchart #1

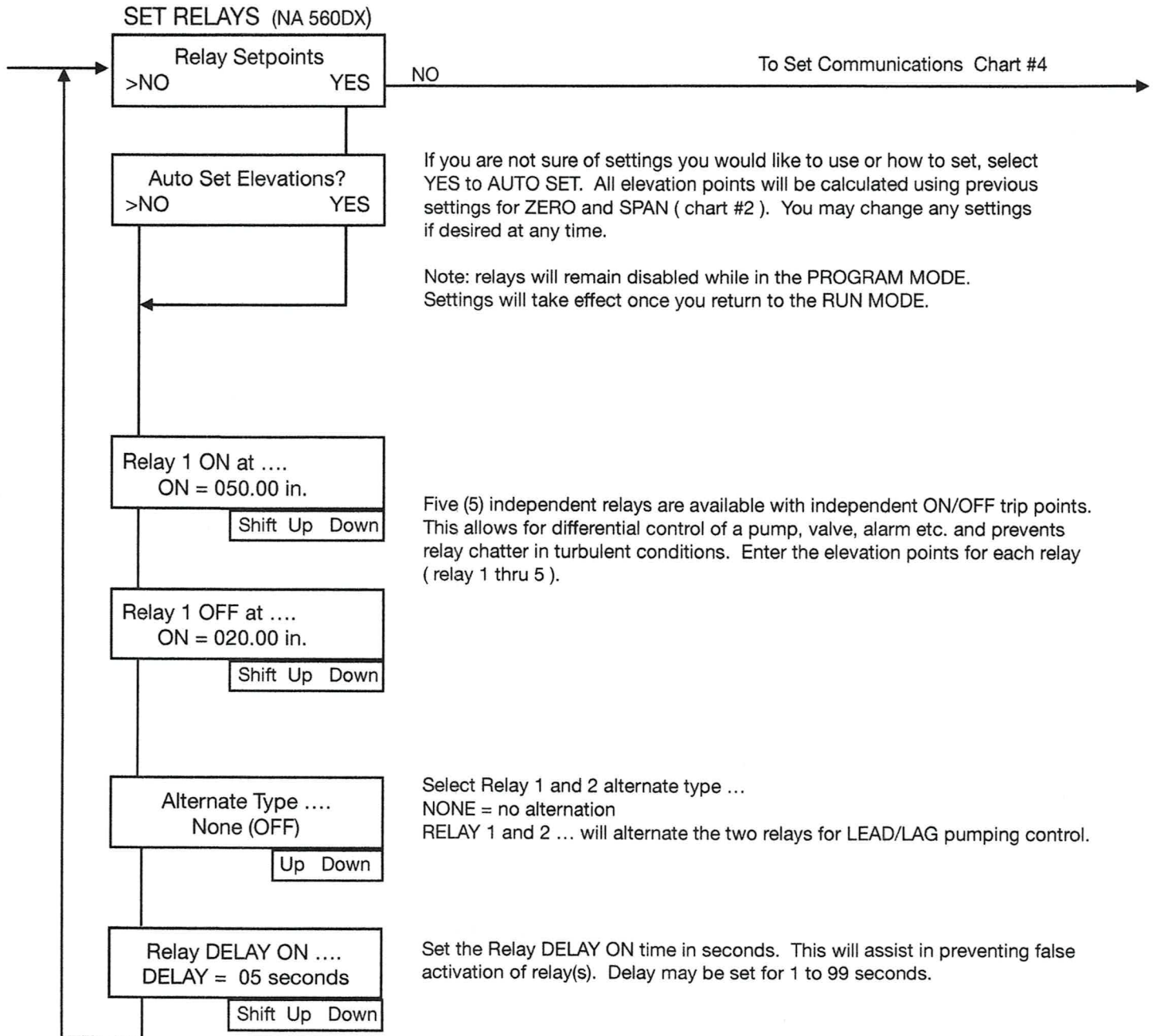


ERS-560 Level Meter Program Flowchart #2

Shadowed Windows (RED) indicate these parameters **MUST** be set by the user to calibrate the meter to their application. All other settings are optional and suggest leaving as set by the factory.



ERS-560 Level Meter Program Flowchart #3



If you are not sure of settings you would like to use or how to set, select YES to AUTO SET. All elevation points will be calculated using previous settings for ZERO and SPAN (chart #2). You may change any settings if desired at any time.

Note: relays will remain disabled while in the PROGRAM MODE. Settings will take effect once you return to the RUN MODE.

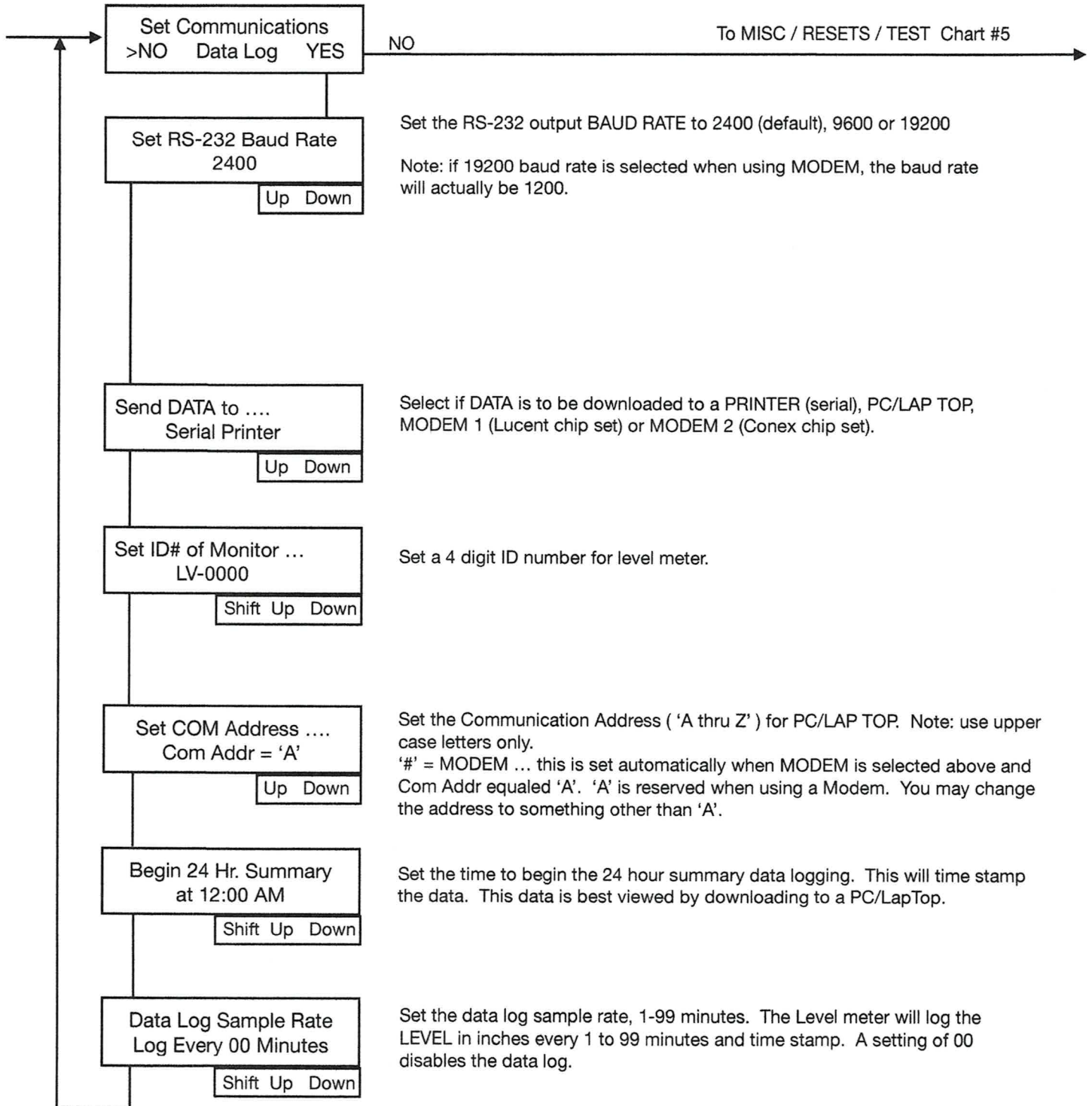
Five (5) independent relays are available with independent ON/OFF trip points. This allows for differential control of a pump, valve, alarm etc. and prevents relay chatter in turbulent conditions. Enter the elevation points for each relay (relay 1 thru 5).

Select Relay 1 and 2 alternate type ...
NONE = no alternation
RELAY 1 and 2 ... will alternate the two relays for LEAD/LAG pumping control.

Set the Relay DELAY ON time in seconds. This will assist in preventing false activation of relay(s). Delay may be set for 1 to 99 seconds.

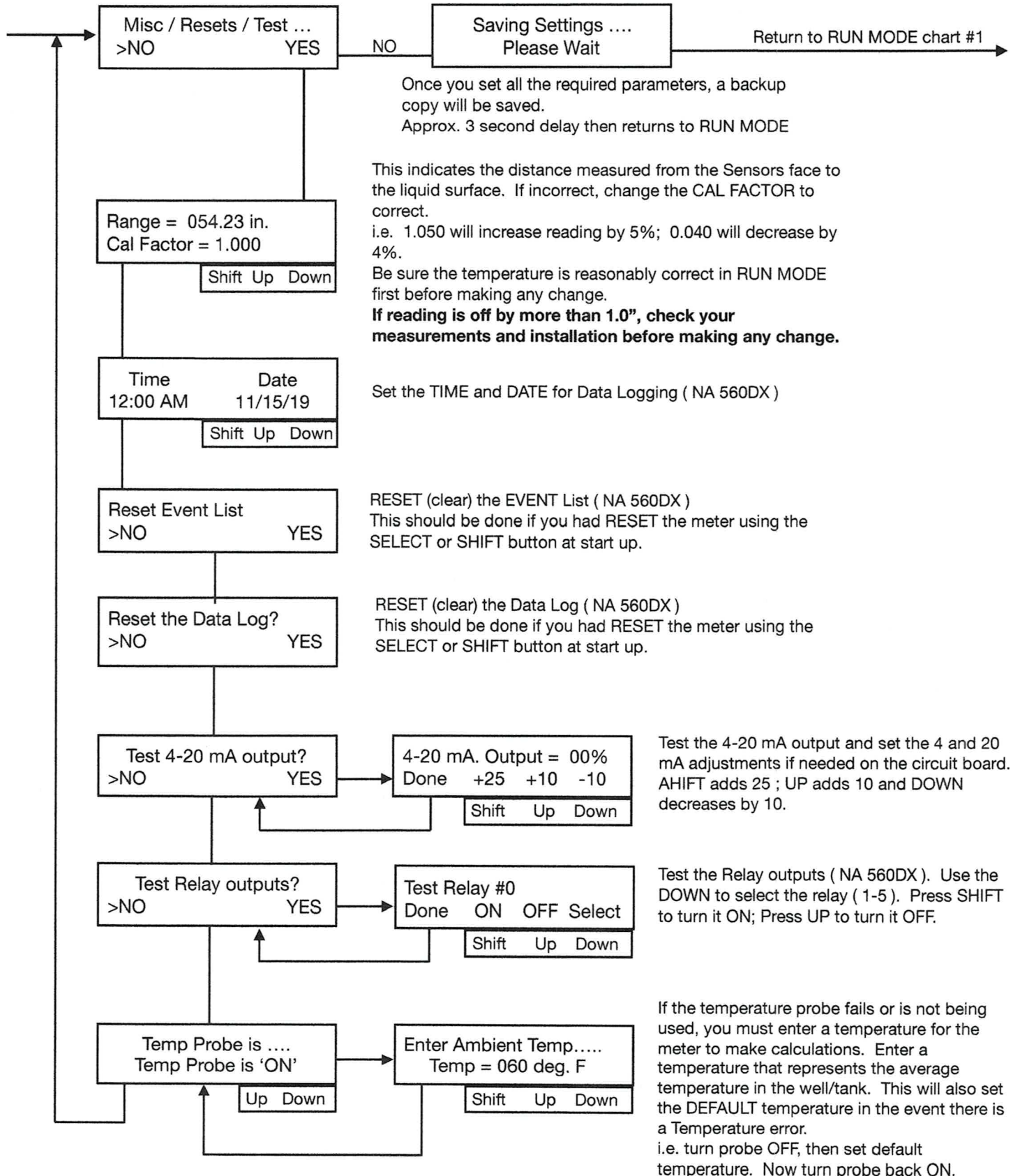
ERS-560 Level Meter Program Flowchart #4

Communications / Data Log (NA 560DX)



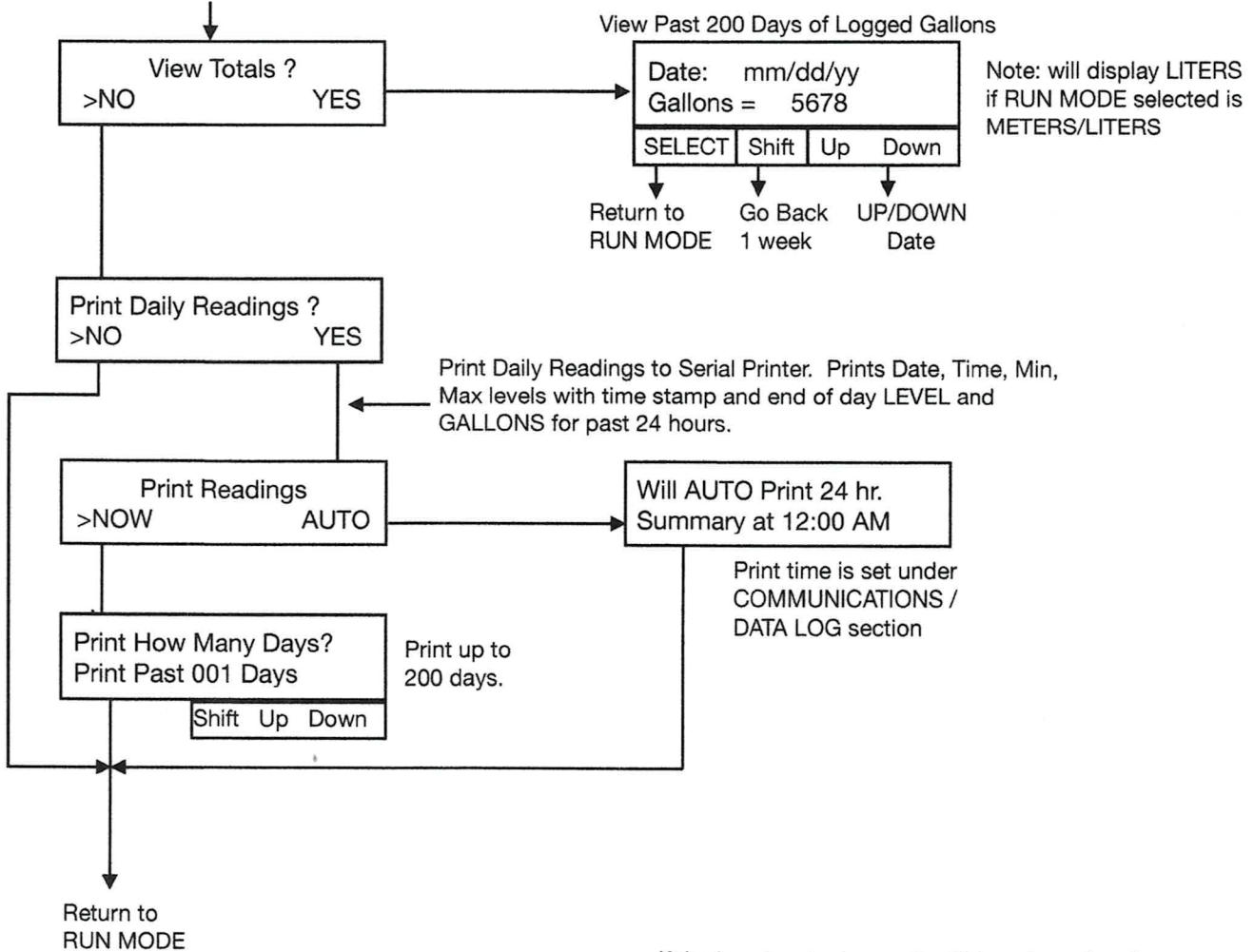
ERS-560 Level Meter Program Flowchart #5

MISC MODE



ERS-560 Level Meter Program Flowchart #6

From Chart #1 (NA 560DX)
when SHIFT (DataLog) is pressed
in the RUN MODE



Display Warnings

Echo Signal Lost!
Check Sensor & Wires

Temperature Error!
Check Probe & Wires

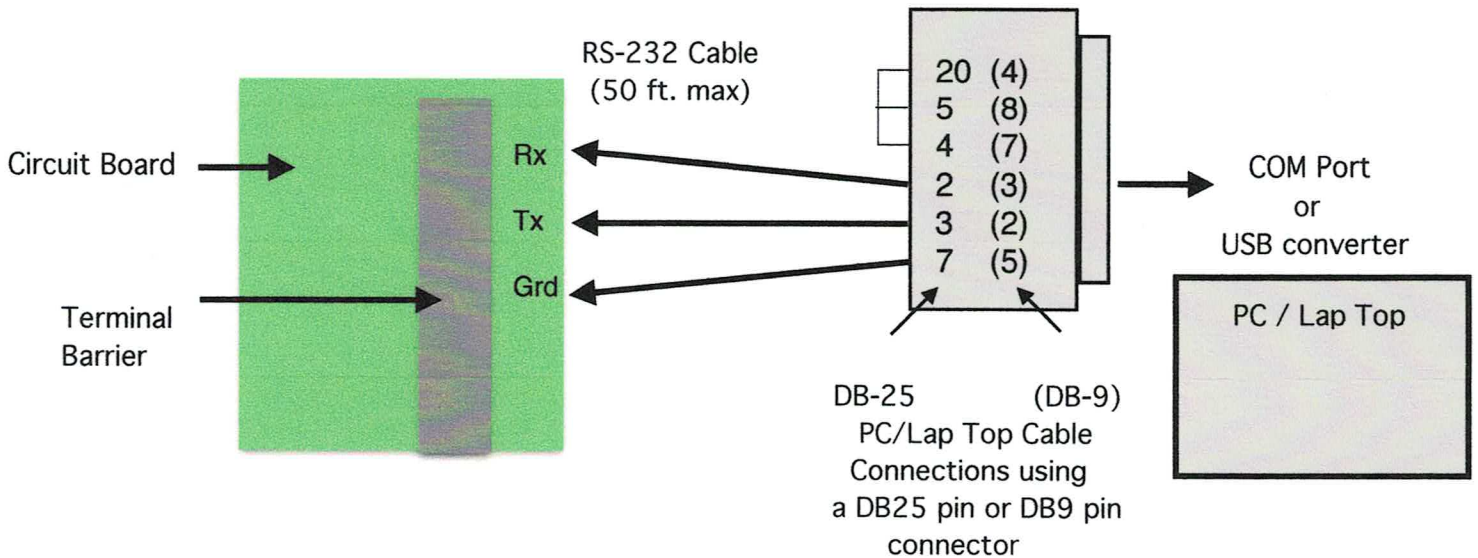
If the Level meter losses the Echo return signal or senses a temperature error (greater than 140° F) or both, a warning will be displayed. If this occurs, check the sensor mounting, installation and wire connections / splices for damage or misalignment.

Other causes of error could be defective sensor and/or temp probe, malfunction of ultrasonic printed circuit card or other. Call factory for assistance.

Press any button to remove warning.

Using the RS232 Communication Output Port (N/A 560DX)

The Operator may choose to communicate with the meter using their PC/Lap Top computer or Modem to download the logged data for further viewing and analysis or view the present status of the meter. This may be accomplished by using any standard communication software package such as HYPER-TERMINAL (if needed, go to Hyper Terminal web site for software download). All data downloaded is in ASCII format. Each line of data is terminated by a CR (carriage return) and line feed. Downloading of Level data may be initiated from the meter using the PRINT function (Press SHIFT when in RUN MODE) or by the PC/ Lap top computer. Connect your communication cable to the RS-232 terminal barrier or RJ11 modular jack (located at bottom right corner of circuit board) and your PC communication port (COM 1 or COM 2) as indicated. Note: make connections BEFORE turning on PC/Lap Top to prevent port damage.



Make the connections shown to a 25 pin or 9 pin cable connector/socket as shown.

An RJ11 modular cable (reversing network cable, 4 wire) with 9 pin adapter to COM 1 or COM 2 port (use USB converter if needed) on PC/Lap Top may also be used. Maximum cable length not to exceed 50 feet.

In order to successfully download data, you must first match the communication settings in both the meter and the PC. The meter sends data in one of three baud rates - 2400 (default), 9600 baud or 19200. The baud rate is set in the meter by the user under the Set Communications program section. You may set the meter ID# at this time, the Com Address (default = 'A', recommend leaving as 'A') and whether data will be sent to a SERIAL PRINTER, PC/Lap Top or MODEM.

Saving To File

If you like to save the data to a file, you must first set your communication software in the PC to 'begin capture' (under HYPER TERMINAL 'TRANSFER' menu. See your 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' from the meter has been downloaded and before making a MENU selection. When Download is completed, select 'Stop capture' under the 'TRANSFER' menu.

Communication Settings Using A Modem (user supplied)

You will first need to open HYPER TERMINAL (or other communication software you are using) by selecting: START/PROGRAMS/ACCESSORIES/COMMUNICATIONS/HYPER TERMINAL.

Open HYPER TERMINAL and select if necessary under FILE and PROPERTIES... 'CONNECT USING' and your PC MODEM. Enter phone number etc. for the meter location.

Communication Settings Using A Direct Connection to COM Port

Same as above except under 'CONNECT USING', select 'Direct COM 1 or COM 2', whichever you are connected to with your RS-232 cable (USB, use adapter). You should set the PC parameters to match the meters baud rate, no parity, 8 bit, 1 stop bit, XON/XOFF disabled (i.e. 2400,N,8,1).

Note: It is necessary to disable all communication 'Flow Control' . Do Not use XON/XOFF or other hardware handshaking.

Using A Serial Printer (user supplied)

Select SERIAL PRINTER under Set Communications Send DATA to....

This mode is used to send data to a serial printer and is fairly slow, because a 2 second delay is performed by the meter 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 meters. Printing of data is initiated from the meter by pressing the SHIFT (Data Log) button while in the Run Mode.

To Initiate Download from a PC/Laptop or Modem:

Connect the communication cable to the RS-232 connector on the meter to your PC/Lap Top COM port if not using a MODEM. Open your PC communication software (i.e. HYPER TERMINAL), then:

- 1] If Direct Connection...
type SHIFT-'A' (= com addr 'A' - default) to get the meters attention.
If using a MODEM...
dial up the meter first. Once connection is made, type SHIFT-'#' or Com Address programmed other than 'A'. 'A' is reserved when using a MODEM.
- 2] meter should respond with a greeting, model number and a short menu.

```
Hello!  
Control Electronics ERS-560 Level Monitor  
Enter Download Selection Type....  
1] 24 Hour Daily Flow Summary  
2] Data Entries  
3] Present Status  
4] Data Entries with Plot  
5] Event List  
6] Reset Data Log  
7] Terminate Communication  
8] Show Menu  
Hit SPACE Bar to interrupt Download.  
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 to 200 days 24 hour summary with DATE, MIN/MAX levels in inches or meters with TIME, end of day level and gallons or liters.
- Selection 2: will download level in inches or meters as logged per sample rate (1 to 99 minutes) with date and time.
- Selection 3: Present status of meter.
- Selection 4: same as number 2, but with plot (bar graph type).
- Selection 5: will download the event list.
- Selection 6: resets the Data Log and terminates communication with meter.
- Selection 7: resets the Event List and terminates communication with meter.
- Selection 8: Show MENU again
- Selection 9: Terminates communication with the meter. If using a Modem, make sure to terminate modem connection under HYPER TERMINAL 'CALL' menu.

NOTE:

- 1] while the meter is downloading data, the meter may stop making measurements until download is completed.
- 2] Hit 'SPACE' bar at any time to interrupt the download.
- 3] All downloads begin with the most recent data.
- 4] All downloads begin with a header indicating model#, ID# and date.
- 5] Pressing any key on the meter will terminate communication.

NOTE: USB ports

If your computer or lap top does not have an RS232 COM port, you will need to purchase an RS232 to USB converter. This is available through most office supply stores.

ERS-560 Troubleshooting Guide

Symptom	Cause	Check or Try
<p>#1 No display and/or backlighting</p> <p>No Power Light</p>	<p>No Power</p> <p>Defective Display</p>	<p>Check power circuit breaker and wiring</p> <p>ON/OFF switch on main circuit board</p> <p>Ribbon cable not secure</p> <p>0.5 amp fuse on main circuit board</p>
<p>#2 Keypad Does Not Respond</p>	<p>Ribbon Cable</p> <p>Lightning or Power surge</p>	<p>Check ribbon cable</p> <p>Turn Meter OFF/ON</p> <p>RESET meter ... see page 23</p>
<p>#3 4-20 mA. Output Not Functioning</p> <p>4-20mA Indicates Max All The Time (see #9 below)</p> <p>Output Not Same As Display</p>	<p>Defective Wiring</p> <p>Defective Output and/or Lightning Damage</p> <p>Not Scaled Correctly</p>	<p>Check wiring and polarity. Disconnect output wires and check with current meter. If OK, receiver or wiring is problem.</p> <p>Replace Q1 and /or Q2 (2N3904 transistor) and U1 (LM324 IC) on main circuit board.</p> <p>Go to programming, 'SCALE 20mA OUTPUT' and 'TEST ANALOG OUTPUT'</p>
<p>#4 Display Does Not Change or Update</p>	<p>Processor Crash</p> <p>Lightning or Power Surge</p>	<p>Turn Power OFF/ON</p> <p>RESET meter ... see page 23</p>
<p>#5 Pass Code Lockout</p>	<p>Wrong Code</p> <p>Code Corrupted</p>	<p>Call Factory for alternate code</p> <p>Provide product SN#</p> <p>Call (610) 942-3190</p>
<p>#6 Display Says 'ECHO LOST, Check Wiring</p>	<p>Sensor NOT LEVEL</p> <p>Accoustic Signal Path Obstructed</p> <p>Defective wiring or wrong cable type</p> <p>Defective Sensor</p>	<p>Check sensor mounting for plumb</p> <p>Check for signal path obstructions, foam on water surface etc.</p> <p>Check wire splices for break or short - Do not solder or use wire connectors at splice - use wire nut and electrical tape</p> <p>Test sensor back at the meter to by-pass cable run ... replace sensor and/or PC-54 transmit/receive circuit card if needed</p>

