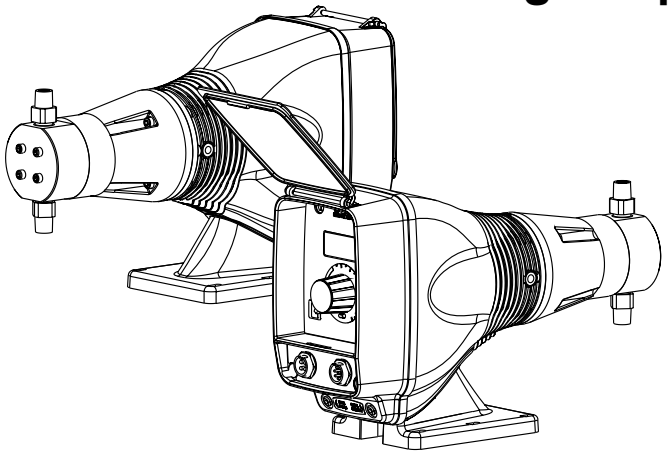
Instruction **Manual**

Series HH
Electronic Metering Pumps



Carefully read and understand all precautions before installing or servicing any metering pump.

CAUTION

CAUTION

For file reference, please record the following data:

Model Number:_____

Serial Number:_____

Installation Date:_____

Installation Location:_____

When ordering replacement parts for your LMI Series HH Metering Pump or Accessory, please include complete Model Number and Serial Number of your unit.

LMI
MILTON ROY

201 Ivyland Road
Ivyland, PA 18974 USA
TEL: (215) 293-0401
FAX: (215) 293-0445
http://www.lmipumps.com

ISO 9001 Certified

1983.A 03/04

Contents

1.0 Introduction

LMI is the world's most versatile manufacturer of economical and efficient metering pumps. This manual addresses the installation, maintenance and troubleshooting procedures for the HH Series manually and externally controlled pumps. LMI has a worldwide network of stocking representatives and authorized repair centers to give you prompt and efficient service.

The Series HH9 electronic metering pump offers an extensive range of features, including microprocessor control for accurate and flexible automation in response to instrument signals. The microprocessor design employs a customized liquid crystal display (LCD) and tactile response keypad. The "state-of-the-art" surface mount electronics are fully encapsulated to ensure protection in its working environment. All external inputs and outputs are opto-isolated from the microprocessor.

Please review this manual carefully. Pay particular attention to warnings and precautions. Always follow good safety procedures, including the use of protective clothing, eye and face protection.

1.1 Spare Parts

LMI recommends replacing all components subject to wear and tear on an annual basis. RPM Pro Pacs™ and spare part kits are available from your local LMI Master Stocking Distributor. The spare parts kit for the HH pump is SP-987.

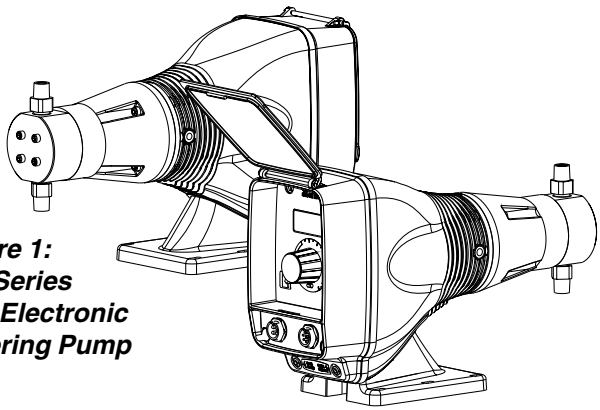
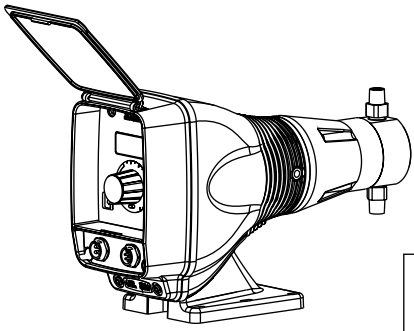


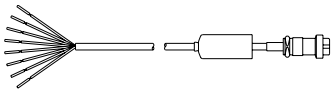
Figure 1: LMI Series HH9 Electronic Metering Pump

2.0 Unpacking

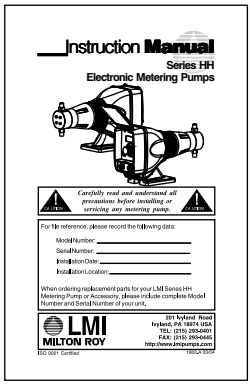
You should find the following items in the box:



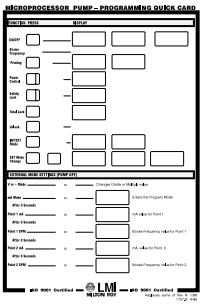
Electronic Metering Pump



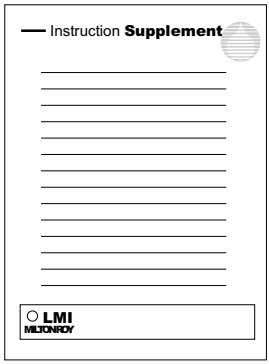
8 Pin Cable (Series HH9 Only P/N 33738)



Series HH Instruction Manual (P/N 1983)



Quick Card (Series HH9 Only P/N 1757)



Instruction Supplement

Figure 2: Unpacking Items

3.0 HH9 Features

- ☐ Stroke frequency adjustment from 0 SPH (strokes per hour) to 100 SPM (strokes per minute).
- ☐ Internal (manual) or external mode select.
- ☐ Flexible slope adjustable response to mA input signals.
- ☐ Divide or multiply (batch) incoming pulses (1 to 999).
- ☐ Batch accumulate option.
- ☐ Integral blowdown controller feature.
- ☐ Keypad locking.
- ☐ Low-level shutoff with alarm output.
- ☐ 6-level pressure control.
- ☐ Continuous non-volatile memory (EEPROM)--no battery required.
- ☐ Remote ON/OFF control.
- ☐ Pulse (pacing) output.
- ☐ Automatic line voltage compensation and over voltage protection.
- ☐ Programmable menu for optional features/parameters.

4.0 How to Interpret the Model Number

The silver data plate (located on the front of the pump) tells you how your pump is configured.

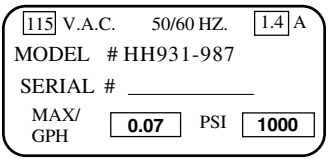


Figure 3a : Data Plate

Included on the data plate is the model number of the pump. Each number in the model number represents the following in Figure 3b.

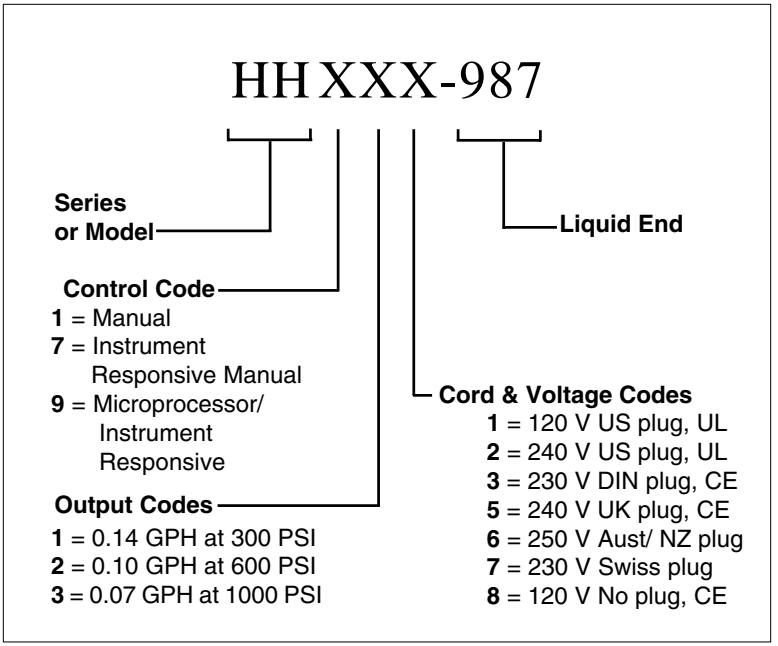


Figure 3b : Model Number Representation

5.0 Pre-Installation Instructions

Specific precautions should be taken when working with all LMI metering pumps. Please read this section carefully prior to installation.

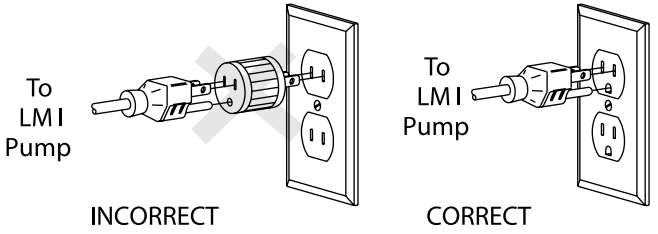
Protective Clothing

ALWAYS wear protective clothing, face shield, safety glasses and gloves when working on or near your metering pump. Additional precautions should be taken depending on the solution being pumped. Refer to MSDS precautions from your solution supplier.

Water Pre-Prime

All LMI pumps are pre-primed with water when shipped from the factory. If your solution is not compatible with water, disassemble the Pump Head Assembly. Thoroughly dry the pump head, plunger, and check valve components. Reassemble head assembly tightening screws in a crisscross pattern. Refill the pump head with the solution to be pumped before priming the pump. (This will aid in priming.)

WARNING: to reduce the risk of electrical shock, the metering pump must be plugged into a grounded outlet with ratings conforming to the data on the pump control panel. The pump must be connected to a good ground. **DO NOT USE ADAPTERS!** All wiring must conform to local electrical codes.



6.0 Installation Instructions

The minimum allowable system pressure for the HH pump is 200 psi. If your system operates at a lower pressure, a back pressure valve must be installed.

6.1 Pump Location

Locate the pump in an area convenient to the solution tank and electrical supply. The pump should be accessible for routine maintenance, and should not be subjected to ambient temperatures above 122°F (50°C).

6.2 Pump Mounting

The HH pump requires a **Flooded Suction** installation. The pump should be securely mounted at the base of the storage tank with the suction piping sloping downward to the pump.

All piping should be cleaned and blown-out prior to connection to the HH pump.

6.3 Plumbing

Always adhere to local plumbing codes and requirements. Be sure the installation does not constitute a cross connection. Check your local plumbing codes for guidelines. LMI is not responsible for improper installations.

The HH high pressure metering pump utilizes 1/4" N.P.T. connections. These connections require the use of Teflon Tape. When applying the Teflon Tape, make sure it does not extend over the fitting. This would restrict the flow of chemical.
All piping being attached to the HH must be cleaned and blown out to prevent debris from entering the Liquid End. A 100 micron strainer or filter should be installed to prevent any debris in the chemical from entering the pump.

Both the discharge and suction check valves should be supported while tightening the mating pipe connections. This is done by placing a wrench on the check valve flat, to prevent it from turning and becoming over tightened, when connecting the pipe.

The discharge piping must be installed and supported so that it does not place a supportive load on the liquid end.

Series HH pumps are capable of developing 1000 psi of discharge pressure. All piping must have sufficient rating to withstand maximum pressure.

For calibration purposes, it is recommended that a 200 mL graduated cylinder be piped in-line, on the suction side of the pump (see Figure 4).

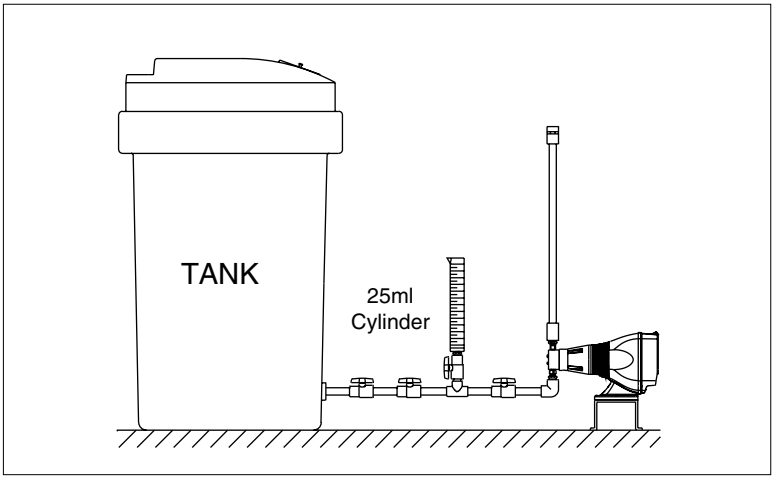


Figure 4: Series HH Recommended Installation.

6.4 External Control Connections

The HH7 and HH9 come standard with various electrical connectors. These are located on the front of the pump. The functions and appropriate connections are covered in greater detail later in this manual.

The HH pump comes equipped with a 1/8" NPT port on the bottom of the liquid end spacer. This port is provided for draining in the event that the seal stack leaks. Use a 1/8" NPT, Teflon taped connector to safely route any leakage to a suitable container.

6.5 Priming and Operation

LMI performance tests every pump prior to shipping to insure that it meets the design parameters. This test is performed using water. Please be advised that the pumps are shipped with water in the Liquid End. If it is incompatible with the chemical that is being injected, the head must be dried.

When all of the previously mentioned precautions and safety regulations required by your facility or local ordinances have been considered, you may start priming your pump.

The HH precisely injects small amounts of chemical. Due to this characteristic, the HH will take a considerable amount of time to prime. System design may also affect the priming time

The HH9 Control Panel has a Start/Stop button labeled "Hold for Prime". This key has a timer that shuts off after one minute of operation. The lengthy priming time of the HH renders this function unusable. The priming procedure should be done with the pump running in the internal mode.

Step 1- Plug in or switch on your pump

Step 2- While the pump is running, turn the stroke dial knob to 100% and the speed adjustment knob (if equipped) to 80%.

Step 3- Make sure that any valves are open to allow chemical to enter the pump head.

7.0 Output Adjustment Controls

Once the pump is primed, the output must be adjusted to meet the requirements of the system. This adjustment is made by varying both the stroke and speed of the pump.

7.1 Pressure Control Adjustment (HH9 Only):

The pressure control adjustment, unique to LMI, allows for the fine tuning of your HH9 Pump. This reduces over pumping of chemical and power consumption while increasing the accuracy and life of your pump.(See Section 11.3)

7.2 Speed Adjustment:

The HH9 speed control can be adjusted manually, using the keypad or externally as described in section 11. In either case, the speed adjustment controls the frequency or rate at which the chemical is being injected.

The HH1 and HH7 come equipped with a manual speed adjustment knob. Turning the knob clockwise to the maximum setting increases the stroke rate up to 100 strokes per minute.

HH7 Only:
When operating the pump in external mode, the speed control knob should be turned fully counter clockwise.

7.3 Stroke Adjustment:

The Stroke Adjustment dial controls the volume of chemical being injected with each stroke. The 100% setting indicates the maximum volume per stroke.

The maximum rated output of your pump is indicated on the data plate. The HH output control features have been designed to make it easy for the user to determine the appropriate speed and stroke settings.

7.4 Calibration

The HH has been designed to inject a precise, repeatable amount of chemical against system pressure. Because every system is different, it is necessary to calibrate the pump once it is installed. The calibration will enable you to fine tune the HH to provide the desired injection amount.

The HH calibration is done after the pump is fully primed. The discharge or injection point must be at normal operating pressure for an accurate calibration to be done.

The suction line should be valved to run off the in-line calibration cylinder. This cylinder must reproduce the suction pressure applied by the tank (see Figure 4).

8.0 Accessories

8.1 8-Pin Cable (P/N 33738 HH9 Only)

The 8-pin external cable assembly can be used to control stroke frequency in response to a 0 to 20 mA or 4 to 20 mA instrument signal. This cable assembly also provides output signals for pacing (pulse output), alarm (general) and computer alarm.

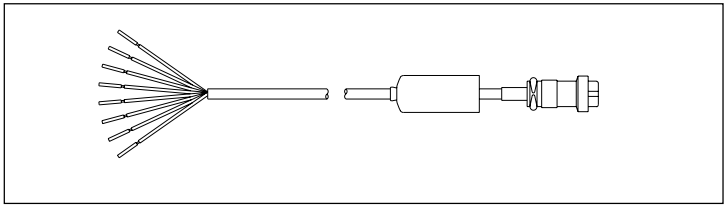


Figure 5: 8-Pin Cable (P/N 33738)

PIN	WIRE	SIGNAL
1	Red	+15V Output
2	Black	-15V Ground
3	Violet	+0-20 or 4-20 mA (+) Input
4	Green	-0-20 or 4-20 mA (-) Input
5	Orange	Pulse Output
6	Yellow	Alarm Output
7	Brown	Flow Input
8	Blue	Computer Alarm Output & Computer Output

Table 1: Pin Out Table - 8-Pin Cable (P/N 33738)

8.2 Optional 4-Pin Cable (P/N 33796 HH9 Only)

The optional 4-pin external cable is used for connecting incoming pulse or pacing signals such as those triggered by a manual switch, reed switch, opto-coupler or by NPN or PNP transistors. The remote ON/OFF input is also accessed through the standard 4-pin connector.

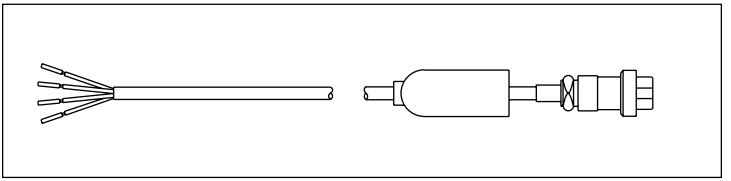


Figure 6: 4-Pin Cable (P/N 33796)

PIN	WIRE	SIGNAL
1	White	+15V Output
2	Black	Pacing input
3	Green	+15V Ground
4	Red	Remote ON/OFF & Computer Input

Table 2: Pin Out Table - 4-Pin Cable (P/N 33796)

8.3 Optional 4-Pin Cable (P/N 28368 HH7 Only)

The optional 4-pin external cable is used for connecting incoming pulse or pacing signals such as those triggered by a manual switch, reed switch, opto-coupler or by NPN or PNP transistors.

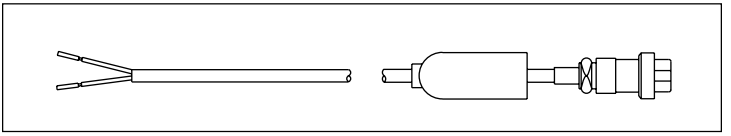


Figure 7: 4-Pin Cable (P/N 28368)

PIN	WIRE	SIGNAL
1	White	Pacing Input
2	Black	Pacing input
3	None	None
4	None	None

Table 3: Pin Out Table - 4-Pin Cable (P/N 28368)

8.4 Optional "Hall Effect" Cable (P/N 33833)

An optional cable assembly is available for pacing your pump directly from an LMI Flowmeter fitted with a Hall Effect sensor. This cable connects to the Flowmeter as shown in Figure 8 (There is no need for a Programmable Divider; its function is built into the pump).

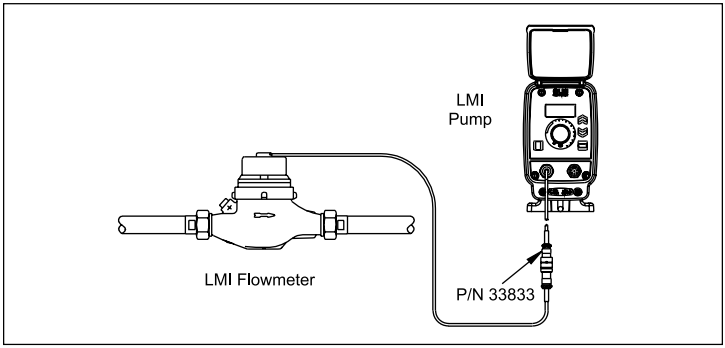


Figure 8: Optional "Hall Effect" Cable (P/N 33833)

9.0 Checking Pump for Proper Zero Position (Stroke Knob)

1.With pump running, turn stroke knob counter-clockwise ↶ toward zero or end of black or red band on dial.

2. LISTEN to the clicking as the pump is running. The pump should operate quietly at the zero position (no clicking).

3. If the pump continues to click at zero or stops clicking before zero is reached, the pump zero must be reset.

9.1 Push on Knob

Re-Zeroing and Stroke Knob Disassembly and Assembly

1.Remove stroke knob from the pump by grasping the knob firmly and pulling it toward you.

2.Pry off the yellow cap.

3.Place the knob on a flat surface.

4.Using needle-nose pliers, squeeze the inner section together while lifting the outer section up.

5.Push the inner section back onto the “D” shaped stroke shaft.

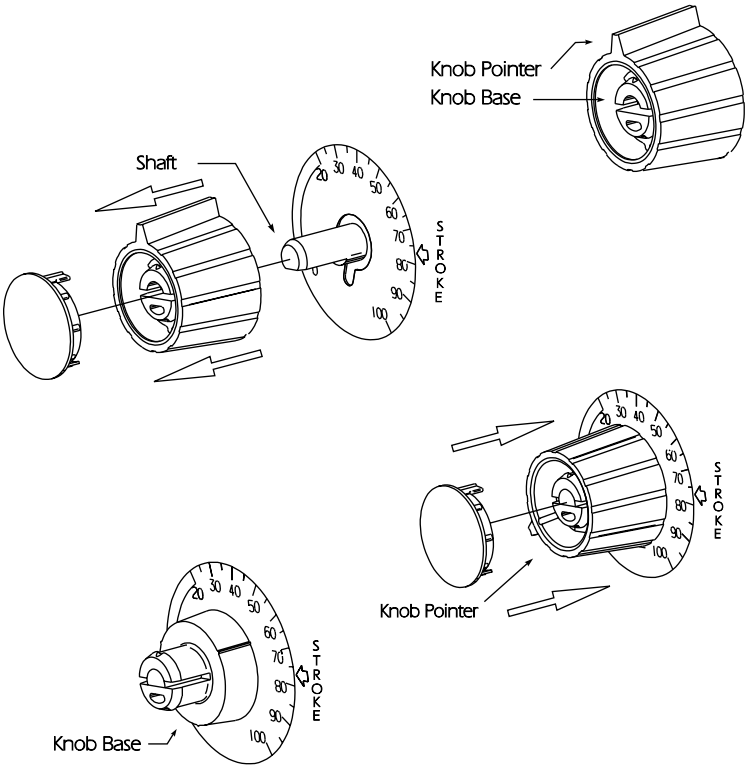
6.With the pump running, zero the pump by turning the inner section of the knob counter-clockwise ↶ until the pump stops clicking.

7. Position the outer section of the knob so that the pointer aligns with zero on the nameplate or end of the black or red band.

8. Push down on the outer section (a snap sound indicates parts are locked together).

9. Replace the yellow cap over the outer section of the knob, aligning the tabs on the cap with the slots inside the knob.

Figure 9: Stroke Knob Assembly



10.0 Keypad/Display: Description and Function (HH9 Only)

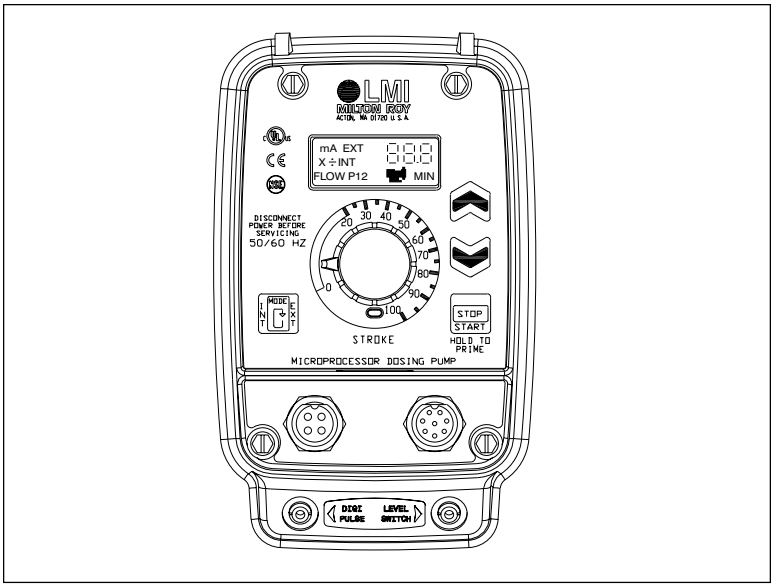


Figure 10: HH9 Keypad

10.1 LCD Screen

The LCD screen is the window in which all values and menu choices are displayed (see Figure 11).

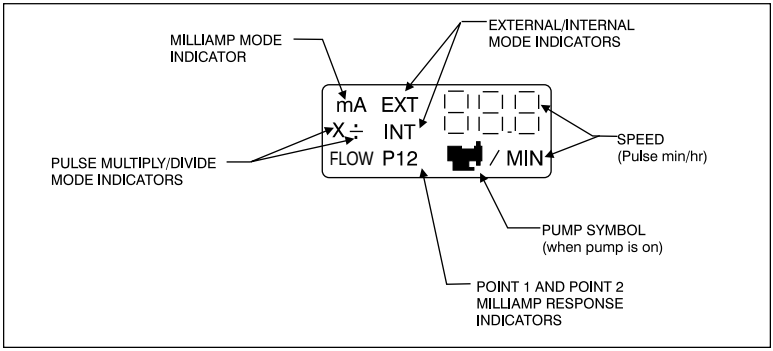


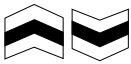
Figure 11: Liquid Crystal Display

10.2 Start/Stop 

The 

(Start/Stop) key turns the pump on or off. If the pump is not running, pressing this key will cause the pump to start running. The symbol appears on the display while the pump is running. Each time the pump strokes, the symbol clears. If the pump is running, pressing the 

(Start/Stop) key will stop the pump.

10.3 Up and Down Key 

Use the (Up) and (Down) keys when: changing the stroke frequency; altering the pressure level; activating and deactivating the keypad lock; programming the divide and multiply values; accessing the setup menu; and changing certain parameters included in the setup menu. All of these functions are covered in greater detail later in this manual.

10.4 Mode Key 

Use the 

(Mode) key when: changing to or from external or internal mode; accessing the pressure level; activating and deactivating the keypad lock; and accessing specific advanced features in the setup menu.

11.0 Operation of the Series HH9

These pumps feature EEPROM nonvolatile memory. The pump will always power up in the last used mode. When shipped from the factory the pump will power up in the "Internal" (manual) mode, with the pump OFF and a speed setting of 100 SPM.

If the power to the pump is cut less than 15 seconds after the last programmed values have been set, the latest changes will NOT be stored in nonvolatile memory. Allow at least 15 seconds before disconnecting from power to ensure that the latest changes are stored.

11.1 Pump Start/Stop

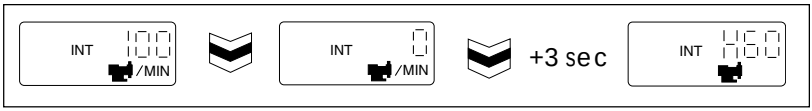
Press the STOP START (Start/Stop) key to start or stop the pump. When the pump is OFF, the LCD screen will alternate between INT OFF and INT 100 /MIN every 16 seconds. When you start the pump, the symbol appears on the LCD INT 100 /MIN. Each time the pump strokes, the symbol disappears. Press the STOP START (Start/Stop) key again to stop the pump.

"INT" signifies that the pump is in the "Internal" (Manual) mode.

11.2 Speed

The speed may be changed with the pump ON or OFF. To increase or decrease the speed, press or hold the (Up) or (Down) key. The range runs from 0 SPH to 100 SPM. While normally the speed will be set in SPM, if settings of SPH are desired, hold the (Down) key until the display reads 0, then continue to hold it for an additional three (3) seconds. The display will then show H60, which is 60 SPH. The speed can be further reduced to 0 SPH with the (Down) key.

For example:



11.3 Pressure Level Control

The maximum pressure rating of your pump can be adjusted to reduce pulsation shock in your discharge line. The pumps have a 6-point pressure control scale. The minimum setting is 0 and the maximum is 5. To access the pressure setting, press the 

(Mode) key and  (Up) key at the same time and hold for two (2) seconds. The current pressure setting 

may be altered using the  (Up) or  (Down) keys.

The pressure may be changed with the pump ON or OFF and in either Internal or External mode.

11.4 Keypad Lock

The pump has two (2) lock modes to prevent casual tampering. The small "LOC" de-activates all key functions *except* 

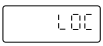
(Start/Stop) and Prime. To activate this "LOC" mode, press the 

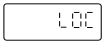
(Mode) key and  (Down) key at the same time and hold for two (2) seconds. The LCD will read 

for five (5) seconds and then return to the previous display. This display 

re-appears when any key except the 

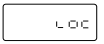
(Start/Stop) key is pressed.

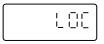
The large "LOC" disables *all* keypad entries, including Start/Stop. Activate this by pressing the Mode, Down, and Up keys at the same time and holding for two (2) seconds. The LCD will read 

for five (5) seconds and then return to the previous display. This display 

re-appears whenever any key is pressed.

To de-activate either lock mode, press the 

(Mode) key and  (Down) key at the same time, and hold for two (2) seconds. The 

or 

will disappear.

11.5 Low-Level Switch (P/N 29190)

When the Low-Level Switch is fitted to the pump and a fault condition exists, the "E1" error code will flash on the LCD screen 

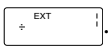
.

For more information on the Low-Level Switch, see the Low-Level Switch Assembly information sheet (P/N 1368).

When a fault condition exists, the pump is stopped and the alarm and computer alarm lines are activated to allow remote monitoring. After clearing the fault (by filling the tank), the pump will automatically restart.

12.0 External Control Modes for HH9

To access the pulse divide, pulse multiply or milliamp response, the pump must be changed from Internal (manual) mode to External mode. To do this, first be sure the pump is stopped. Press the 

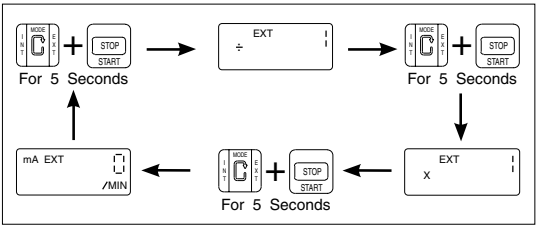
(Mode) key and hold it for three (3) seconds. The LCD screen displays the last External mode that was programmed. If this is the first time the pump has been put in the External mode, the factory default will be displayed on the LCD screen. The factory default mode is "External Pulse Divide" with a divide value of one (1) 

. The display will alternate between SPM and OFF.

External Mode Select: Pulse Divide, Pulse Multiply, and mA Response

Any of three external modes may be selected when the pump is stopped by pressing and holding the (Mode) key and (Start/Stop) key for five (5) seconds, then releasing. As noted above, the default is Pulse Divide. Pressing and releasing these keys brings you to the Pulse Multiply mode . In this mode, the LCD screen alternates between the pulse multiply value and OFF. Pressing and releasing these keys one more time brings you to the third external mode, mA response . In this mode the LCD screen alternates between SPM and the mA value.

Summary of External Mode Select



12.1 Programming the Pulse Divide Value

The divide value is altered by using the (Up) and (Down) keys. To do this, the pump must be in the External Divide mode and be OFF. The valid range for the divide value runs from 1 to 999. With the pump running in the Divide mode, the speed in SPM is calculated based on the rate of incoming pulses and the divide value, and displayed on the LCD screen .

If the calculated speed is less than one (1) SPM, the LCD screen will display 0 SPM. If the calculated speed is GREATER THAN 100 SPM, the E3 error code will be displayed periodically until the fault condition is corrected . This error does NOT activate the alarm outputs or stop the pump.

12.2 Programming the Pulse Multiply (Batch) Value

The multiply value is altered by using the (Up) and (Down) keys to change the value. The pump must be OFF and in the External Multiply mode. Like the divide value, the valid range for the multiply value runs from 0 to 999 pulses. When the pump is ON, a single external pulse will initiate a batch of pump strokes. The number of remaining pulses are displayed on the LCD screen 

. When 0 is reached, the display resets to the multiply value. The pump is now ready for another pulse input.

If a pulse is received before the countdown to 0 is complete, the E4 error code is displayed, and the pump batch count resets to the programmed multiply value. The batch countdown then continues from its programmed value. As the countdown continues, the E4 error code 

will be displayed intermittently until the fault is corrected. The strokes that remained from the first batch are *NOT* accounted for. To clear the fault display, the pump must be stopped and restarted.

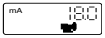
To allow true flow proportioning, the speed in the Multiply mode is equal to the speed set in the Internal (manual) mode. That is, if the Internal mode speed is set at 60 SPM, in the External Multiply mode the pump counts down at 60 SPM.

Batch Accumulate

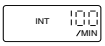
The Batch Accumulate function allows you to opt to have any extra input pulses received in the multiply mode accumulate up to a maximum batch of 999. If Batch Accumulate is enabled and a pulse is received during the countdown, the programmed multiply value will be added to the current displayed value. Pulses causing the maximum batch of 999 to be exceeded will result in an E4 error message. When Batch Accumulate is enabled, the LCD screen alternates between the current multiply value and "ACC"  . The Batch Accumulate function is activated in the Setup Menu (see Section 13).

12.3 Programming the mA Response

The HH9 pump accepts a 0-20 mA or 4-20 mA signal directly. The response to this signal is fully programmable. In the mA mode, the pump speed is determined by the programmed response curve, as defined by points "P1" and "P2." The factory default set values for P1 and P2 are (4 mA, 0 SPM) and (20 mA, 100 SPM) respectively. This is illustrated in Figure 12.

While in the mA mode, the pump speed  and the mA value  are displayed alternately every four (4) seconds while the pump is running.

12.4 Programming Points 1 and 2 (SPM)

To program points P1 and P2, first ensure the pump is in the mA mode and OFF. If you wish to program the response in "SPM", switch to the internal mode. The speed must be set to a SPM value  . Return to the External mA mode.

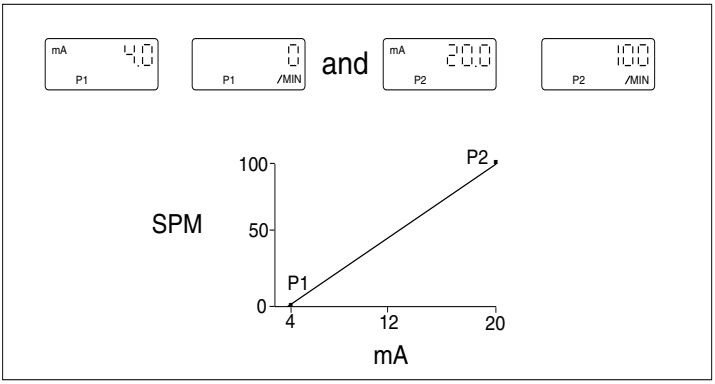
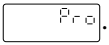
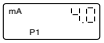
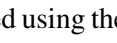
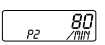
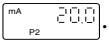
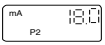
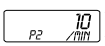


Figure 12

Press either the (Up) or (Down) key. The LCD screen will display  . After five (5) seconds, the display will show the mA value for P1  . This value may be altered using the (Up) or (Down) key within five (5) seconds (i.e. ) . Five (5) seconds following the last key press, the stroke rate for P1 will be displayed  . This value may be altered within five (5) seconds using the Up or Down key (i.e. ).

Five (5) seconds after the last key press, the mA value for P2 is displayed  . Edit as described in the above paragraph (i.e. ). Likewise, five (5) seconds after the last key press the stroke rate for P2 is displayed. Edit as described above (i.e. ).

The above examples would result in the inverse control profile shown in Figure 13 on the following page.

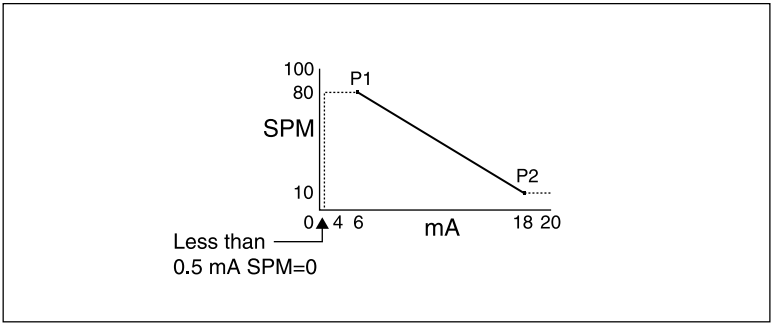


Figure 13

If the mA input goes below the value programmed for P1 or above the P2 value, the response will "plateau," as indicated by the dotted lines above.

The valid input range is from 0.5 to 21 mA. Below 0.5 mA, the pump will be off. Above 21 mA, the E5 error code will be displayed intermittently EXT E5 .

12.5 Programming Points 1 and 2 (SPH)

If you wish to program the response in strokes per hour, start by being in the External mA mode. Next, switch to the Internal mode. If the Internal setting is in strokes per minute, change to strokes per hour by holding the (Down) key until the display reads 0 SPM. Continue to hold it for another three (3) seconds. The display will now read SPH [INT H50]. Set the speed to any SPH value (the actual setting has no bearing on mA response). Return to the External mA mode.

In the External mA mode, pressing the (Down) key or (Up) key will change the display to [Pro]. After five (5) seconds, the display will show the mA value for P1 [mA P1 4.0]. This value may be altered by using the (Up) key or (Down) key within five (5) seconds (i.e. [mA P1 6.0]). Five (5) seconds following the last key press, the stroke rate for P1 will be displayed [P1 H50]. This value may be altered within five (5) seconds using the (Up) or (Down) key (i.e. [P1 H60]).

Five (5) seconds after the last key press, the mA value for P2 will be displayed [mA P2 20.0]. Edit as described above (i.e. [mA P2 18.0]). Likewise, five (5) seconds after the last keypress, the stroke rate for P2 is displayed and may be altered as above (i.e. [P2 H10]).

The above example would result in the inverse control profile shown in Figure 14 on the following page.

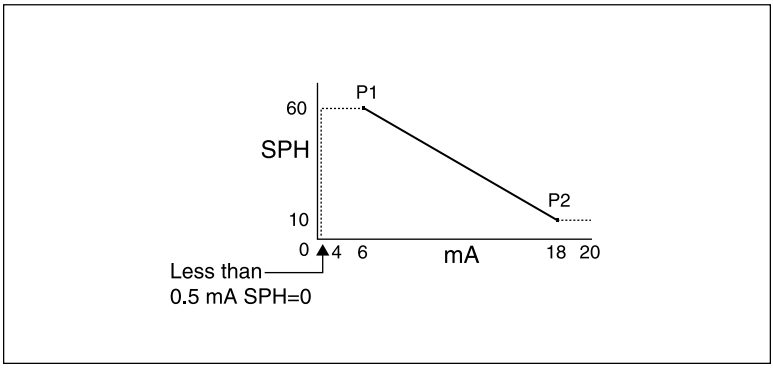


Figure 14

The valid input range is from 0.5 to 21 mA. Below 0.5 mA, the pump will be off. Above 21 mA, the E5 error code will be displayed intermittently EXT E5 .

When programming strokes per hour, the maximum rate is 60. P1 and P2 must BOTH BE SPM or BOTH BE SPH.

13.0 Advanced Features and the Setup Menu for HH9

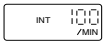
Advanced features such as Batch Accumulate, Computer Interfacing, and Automatic Voltage Compensation, may be selected and altered in the Setup Menu of the Series HH9. The following configuration chart describes each menu item, its description, and available settings.

Menu Item	Description/ Function	Setting	Notes
	Software Revision	Read Only	
1	Batch Accumulate	0 = Disable 1 = Enable	Applies to External Multiply mode
3	Automatic Voltage Compensation	0 = Disable 1 = Enable	Becomes active two (2) minutes after power up.
6	Input Pulse Width	0-60	Allows pulse widths of 1 to 60 mSec to be set. Setting of 0 gives a debounce time of approximately 1 mSec.
7	Integral Blowdown	0 = Disable 1 = Enable	Allows Activation of the integral blowdown feature.
8	Integral Blowdown Solenoid ON Time (Seconds)	0 to 255	Set solenoid ON time in seconds.
9	Integral Blowdown Pump ON Time (Seconds)	0 to 255	Set pump ON time in seconds.

Note: Allow 15 seconds after programming before disconnecting from power to ensure latest changes are stored in nonvolatile memory.

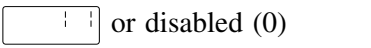
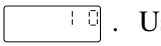
13.1 Accessing the Setup Menu

To access the Setup Menu, ensure that the pump is OFF and in the Internal mode. Using the  (Up) key, bring the stroke rate to 100 SPM. At this point, keep the  (Up) key pressed for five (5) seconds. The LCD screen then displays the current software revision, indicating that you have entered the Menu mode  . Press the  (Mode) key to scroll through the Menu Items. Use the  (Up) or  (Down) key to enable or disable menu functions and program values.

To exit the Menu mode, press the  (Start/Stop) key. Or, if no keys are pressed for 13 seconds, the display reverts to  .

13.2 Menu Items

13.2.1 Menu Item 1: Batch Accumulate Enable/Disable

Batch Accumulate may be enabled (1)  or disabled (0)  . Use the  (Up) or  (Down) key to change the selection.

13.2.2 Menu Item 3: Automatic Voltage Compensation

Menu item 3 enables (1) or disables (0) automatic voltage compensation. This unique feature allows a constant power level to be delivered to the EPU of the pump, even when the voltage of the external power source is fluctuating. This results in smooth pump output in spite of fluctuating voltage and prevents overheating.

Automatic voltage compensation becomes active two minutes after power up.

13.2.3 Menu Items 4 and 5: Flow Monitoring

These menu items are not applicable to the Series HH9 metering pump. Menu item 4 must be disabled (0).

13.2.4 Menu Item 6: Input Signal Pulse Width (Debounce)

Menu Item 6 determines the "debounce" period (pulse width) to be applied to incoming pulse (pacing) signals. The default value is 15, which corresponds to a debounce value of 60 mSec  . Each unit corresponds to approximately 4 mSec. This means that in order to be recognized, an input signal must be at least 60 mSec in duration. This setting may need to be reduced from its maximum setting for high frequency input pulse signals such as those from a Hall Effect flowmeter.

13.2.5 Menu Items 7, 8 and 9 Activate the Integral Blowdown Feature

These Menu Items will require additional accessories and customer supplied components.

This Integral Blowdown feature provides cooling tower control from your LMI microprocessor pump when used in conjunction with a pulse output type flowmeter (batch mode) or 4-20 mA signal (milliamp mode). These signals can then be input into the pump to provide activation of both the pump and a customer supplied solenoid valve.

LMI's Relay Pack, Model RP-100A, must be ordered separately to provide power to the customer supplied solenoid.

A. Batch Mode

Programming Menu

Menu Item 1 Batch Accumulate Select: 0 = (Disable) or 1= (Enable)

Menu Item 7 Integral Blowdown: Select 1 = (Enable)

Menu Item 8 Solenoid ON time: Select 0 to 255 (Seconds)

Select "INT" mode and set the manual strokes per minute.

Select "EXT X" (multiply) mode (batch mode) and program stroke count.

On receipt of a pulse from the flowmeter, the pump strokes the programmed number of pulses. The batch value (multiply [X] value) and manual SPM determines the length of time the pump will be on.

On receipt of a pulse from the flowmeter, the solenoid valve is opened. The solenoid remains open for the length of time programmed in Menu Item 8. If another flowmeter pulse is received before the above is completed the solenoid ON time is extended by the time programmed in Menu Item 8.

14.0 Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
Pump Will Not Prime	1. Pump not turned on or plugged in.	1. Turn on pump/plug in pump.
	2. Output dials not set properly.	2. Always prime pump with speed at 80% and stroke at 100%.
	3. Pump suction not flooded.	3. The HH pump requires a flooded suction. Reposition the pump accordingly.
	4. Air trap in suction piping.	4. Be sure the suction piping is installed so that there are no air traps (see section 6.2).
	5. Too much pressure at discharge.	5. Depressurize discharge piping and verify that system pressure is within the operating pressure of your pump.
Pump Loses Prime	1. Solution container ran dry.	1. Refill container with solution and reprime (see Section 6.0).
	2. Pump suction not flooded.	2. The HH pump requires a flooded suction. Reposition the pump accordingly.
	3. Air trap in suction piping.	3. Be sure the suction piping is installed so that there are no air traps (see section 6.2).

Troubleshooting (continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
Leakage at Piping Connection	1. Piping not sealed.	1. Apply Teflon tape to NPT threads and tighten piping (see section 6.3).
	2. Worn seal rings.	2. Replace o-rings. Spare Parts (SP-987).
	3. Solution attacking Liquid Handling Assembly material.	3. Consult your local distributor for alternate materials.
Low Output or Failure to Pump Against Pressure	1. Pump's maximum pressure rating is exceeded by injection pressure.	1. Injection pressure cannot exceed pump's maximum pressure. See pump data plate.
	2. Worn Check Valves.	2. Replace check valve components. Spare Parts (SP- 987).
	3. Worn Plunger Seal.	3. Replace plunger seal. Spare Parts (SP- 987).
	4. Incorrect stroke length.	4. Check zero on pump/Re-zero pump (see Section 9.0).
	5. Piping run on discharge may be too long.	5. Longer piping runs may create frictional losses sufficient to reduce pump's pressure rating. Consult factory for more information.
Failure to Run	1. Pump not turned on or plugged in.	1. Turn on or plug in pump.
	2. EPU failure.	2. Disassemble pump and measure the resistance of the EPU across the EPU wires (yellow). For 120v HH pump the coil resistance should be 82 ohm. For 240v HH pump resistance should be should be 330 ohm.
	3. Pulser failure.	3. The pulser should be replaced if EPU checks out OK. Consult supplier or factory.
Excessive Pump Output	1. Syphoning. (Pumping downhill).	1. Move injection point to a pressurized location or install a back pressure valve.
	2. Little or no pressure at injection point.	2. If pressure at injection point is less than 200 psi (13.8 Bar)a back pressure valve must be installed.
	3. Excessive strokes per minute.	3. Replace pulser or resistor. Consult factory.

Appendix A: Input/Output Description

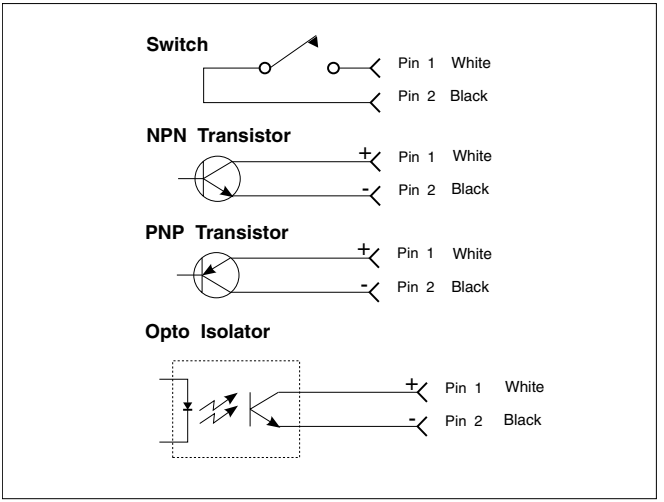
4-Pin Connector

Pacing (Pulse) Input / Opto-Isolated Input (HH7 and HH9 Only)

Methods of Triggering Pump.

Reference: 4-Pin Cable (P/N 33796) (HH9 Only)

4-Pin Cable (P/N 28368) (HH7 Only)



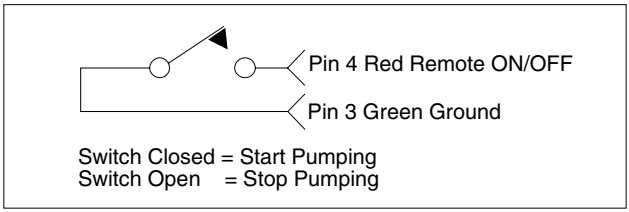
HH9 Only
Switch or transistor must be capable of switching 2mA at 15 VDC. When in the Divide mode, the switch must close then open to trigger.
Minimum time in low impedance state (i.e. switch closed) is 60 mSec. by default.
Setup Menu Item 6 sets this value in multiples of 4mSec.
Example: Default = 4 X 15 = 60 mSec

HH7 Only
Switch or transistor must be capable of switching 2mA at 15 VDC. Minimum time in low impedance state (on) is 50 mSec. Minimum time in high impedance state (off) is 100 mSec.

Remote On/Off (Opto-isolated Input) (HH9 Only)

Switching this line to ground starts the pump. Releasing this line, stops the pump. The (STOP/START) key will always override the Remote Start/Stop.

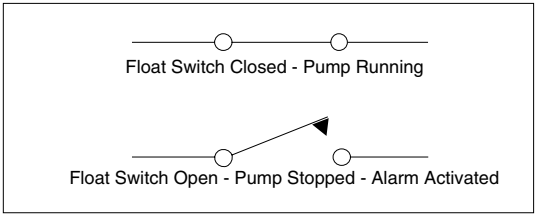
Reference: 4-Pin Cable (P/N 33796)



Switch must be capable of switching 2 mA at +15 VDC. Minimum time in low impedance state (i.e. Switch closed) is approximately one (1) second.

Low-Level Input (P/N 29190) (HH7 and HH9 Only)

Opening the float switch (i.e. breaking the line from ground) stops the pump and activates the alarm output.



Switch must be capable of switching 2 mA at +15 VDC. Minimum time in low impedance state (i.e. switch closed) is approximately 1 second. (For use with LMI Float Switches [P/N 29190.]

Low-level input can be used as a remote start/stop in the HH7.

8-Pin Connector (HH9 Only)

Analog 0-20 mA Input

+0 to 20 mA Violet

-0 to 20 mA Green

8-Pin Cable (P/N 33738)

This is reverse polarity protected with a 22 Ohm impedance, a resolution or 0.1 mA and an accuracy of +/- 0.2 mA typically.

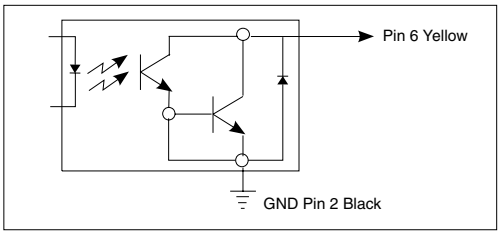
15 v Output

The +15V Output (pin 1 Red) is regulated and capable of delivering 30 mA current.

Alarm Output

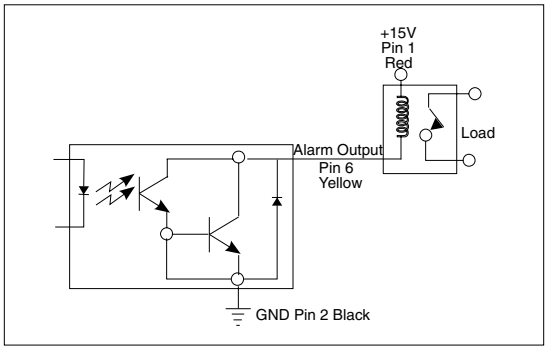
This is an opto-isolated open collector Darlington pair capable of switching 25 mA at +24 VDC to within 1V of ground typically.

Reference: 8-Pin Cable (P/N 33738)



The output pair turns ON when an alarm condition occurs (i.e. low level) and remains ON until the alarm condition is cleared.

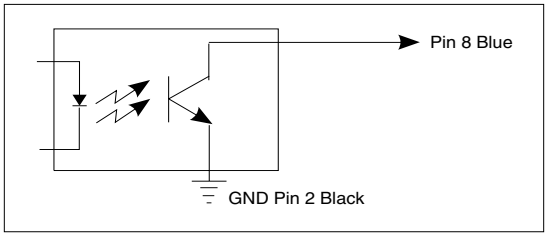
Application: Relay Switching



Computer Alarm Output

This is an opto isolated, open collector output capable of switching 2 mA at +24 VDC to within 0.4V of ground typically.

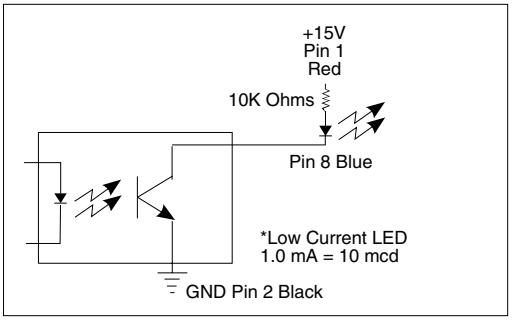
Reference: 8-Pin Cable (P/N 33738)



This output tracks the alarm output (i.e. the conditions for activating and de-activating this output are the same as for the alarm output).

This output may be used to directly switch small loads such as computer inputs and low current LEDs. It may also be used to initiate switching of larger loads if suitable buffer circuitry is provided.

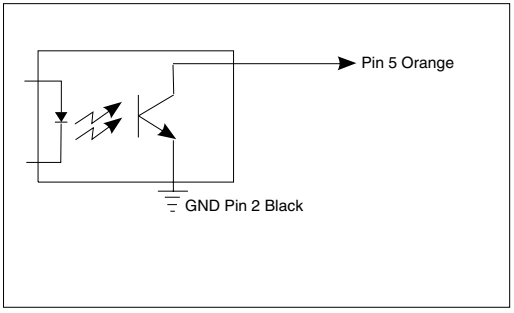
Application: Low Current LED Switching



This is an opto-isolated, open collector output capable of switching 2 mA at +24 VDC to within 0.4V of ground typically.

Pacing Output (Opto-isolated Output)

Reference: 8-Pin Cable (P/N 33738)



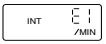
The output transistor turns ON at the start of a stroke and remains ON for approximately 100 mSec.

This is an opto-isolated, open collector output capable of switching 2 mA at +24 VDC to within 0.4V of ground typically.

Appendix B: Summary of Error Messages

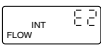
(HH9 Only)

E1



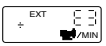
is caused by a Low-Level fault with a Low-Level Switch connected to the pump. The pump is stopped and the alarm outputs are activated. This operates in all Internal and External modes. The pump automatically restarts when the fault is cleared.

E2



indicates that the pump has lost prime. Again, the pump is stopped and output alarms activated. Item 4 in the Advanced Menu must be disabled (set to 0), it is not usable with the HH9 pump.

E3



is displayed in the External mode if the stroke rate exceeds 100 SPM. The pump is NOT stopped and NO alarm outputs are activated with this fault. To stop E3 flashing, clear the fault condition, then stop and restart the pump.

E4

is displayed in the External X (Batch) mode in two situations. 1) If "Batch Accumulate" is disabled and a pulse signal is received while the pump is counting down. The pump is not stopped, and the alarms are not activated. To clear the E4 message, the pump must be stopped and restarted. 2) If "Batch Accumulate" is enabled and the cumulative batch value exceeds 999, E4 will be displayed. The E4 message can only be cleared if the pump is stopped and restarted.

E5

is displayed in the mA External mode if the mA input value exceeds 21.0 mA, whether the pump is running or stopped. Again, the alarms are NOT activated. Once the mA signal goes below 21.0 mA, the E5 error message is cleared.

201 Ivyland Road
Ivyland, PA 18974 USA
TEL: (215) 293-0401
FAX: (215) 293-0445
http://www.lmipumps.com

ISO 9001 Certified

Specifications subject to change without notice.