



*Model 3030*  
*Controller - Indicator - Totalizer*

**Installation, Operation  
and Maintenance Manual**



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## *Installation, Operation & Maintenance*

### **GENERAL**

The Model 3030 is a microprocessor based batch controller-indicator-totalizer. It gives you the ability to perform batch control utilizing single or dual stage shutdown. It also displays process parameters such as rate and total. Several outputs are provided for driving lights, alarms, chart recorders, and totalization for remote operations.

A special mode gives you the capability of simultaneously viewing two flow parameters such as batch count and flow rate. The 3030 contains a set point lock-out system to prevent unauthorized changes from the front panel.

The 3030 may be completely factory programmed for your application. It is equipped with an easy to use menu system with built-in scrolling help messages. This makes programming simple when changes are required. A 10-year memory backs up all program settings and flow parameters in case of a power failure.

The Model 3030 also has RS-485 communications for interfacing with a computer.

### **INSTALLATION**

**Panel mounts:** See dimensions for panel cut-out. Completely install the unit into the panel.

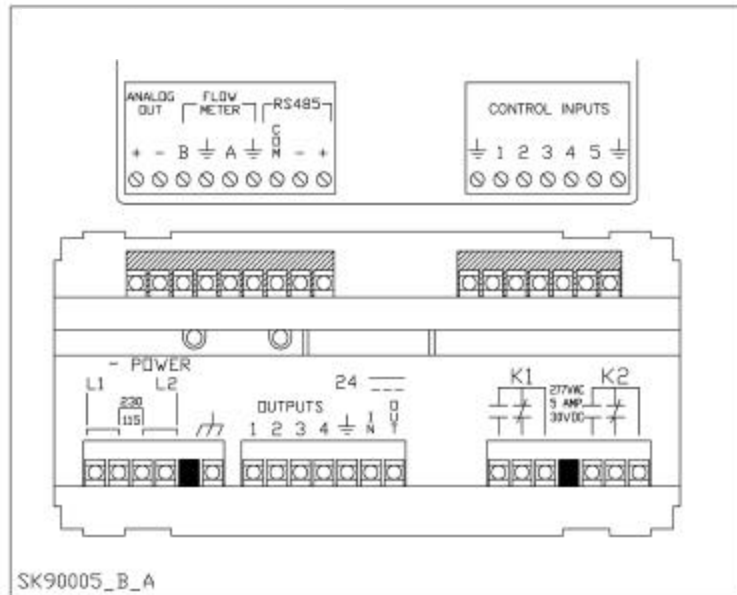
**Wall mounts:** Mount unit to wall. Wires should be 18 inches long inside the enclosure from the point of entry to the point of termination. This will provide ample length so the hinged door will swing freely and allow access to the terminals.

After installing units, place cable clamps (enclosed) on the bottom of the unit near the wiring terminals as needed. Loop the cable ties through the clamps and around the wires to transfer the strain from the terminal blocks to the clamps.

#### **Wiring Notes**

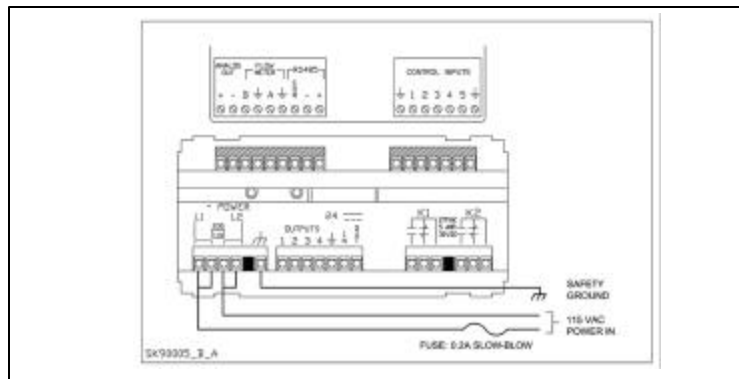
- All connections should be made to the unit with the power off.
- Improper wiring may cause damage to the unit. Double check all connections before powering.
- Do not exceed the power ratings of the components. See Specifications.
- An in-line fuse should be installed in the input power supply line. See Applications Wiring.
- Sensor, control, and AC power lines should not be routed in the same conduit.
- The power connection terminals, L1 and L2, have two terminals each. The terminals for L1 are internally connected, as are the terminals for L2. This allows for easier “daisy chaining” of power when multiple units are used, or for connection of power to the relays, if required.
- When connecting inductive loads to the control outputs, diode protection should be provided.
- At no time should the voltage and current specifications of the relays be exceeded. When connecting loads to the relay outputs, contact protection should be provided to prevent damage due to current and voltage surges. Consult a qualified electrician for applicable protection methods.
- If powering the Model 3030 with a DC supply, it is important to connect the safety ground if switching AC power through the relays. If switching DC power, the safety ground connection is not required.
- On power up, if display reads “Run Installation” press the “Stop” key to clear.

**Wiring Terminal Diagram**

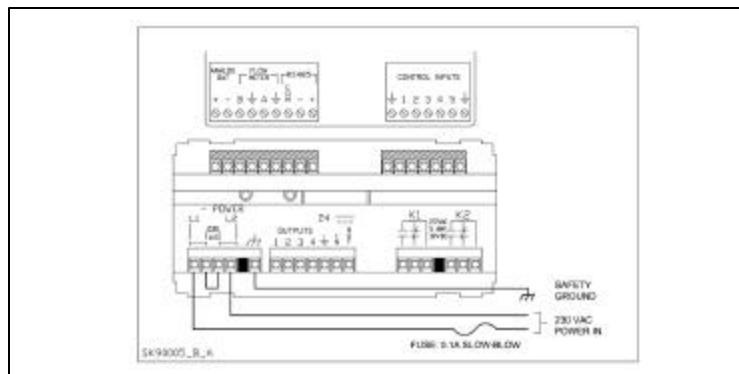


All grounds  $\perp$  (common) are connected internally.

**Applications Wiring**

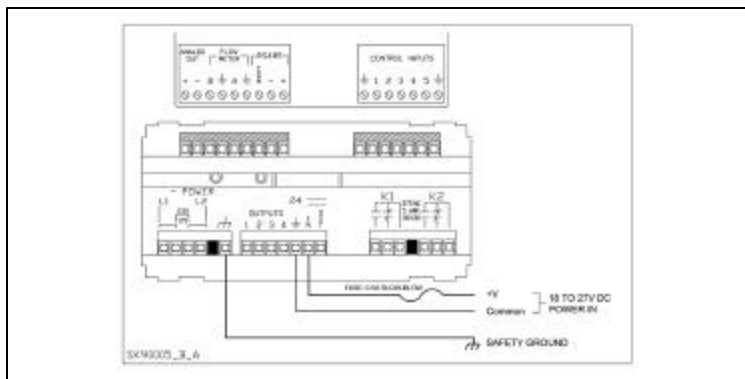


Powering the Model 3030, 115 V AC version

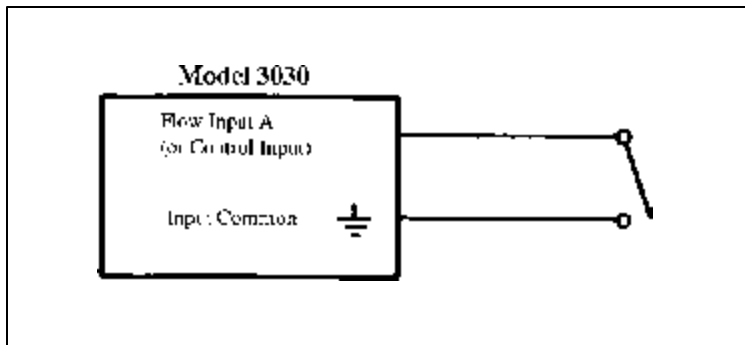


Powering the Model 3030, 230 V AC version

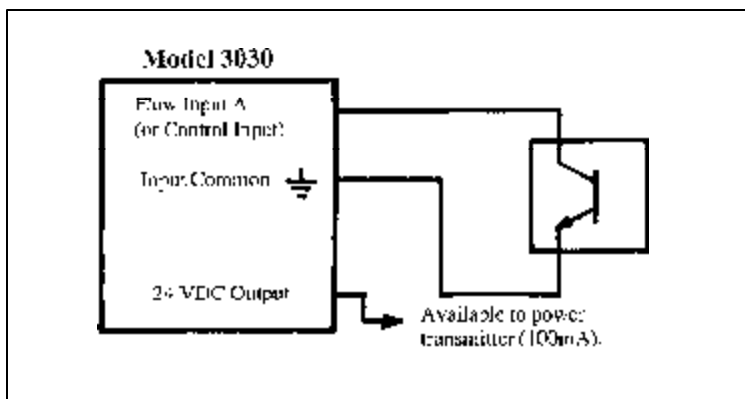
# Model 3030 Controller - Indicator - Totalizer



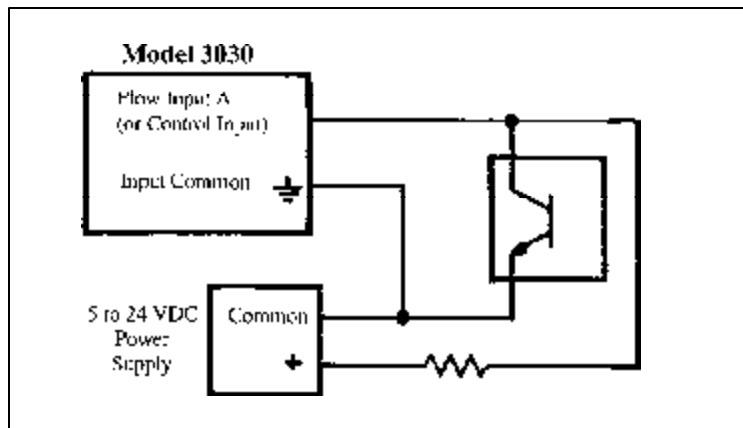
Powering the Model 3030 with DC supply



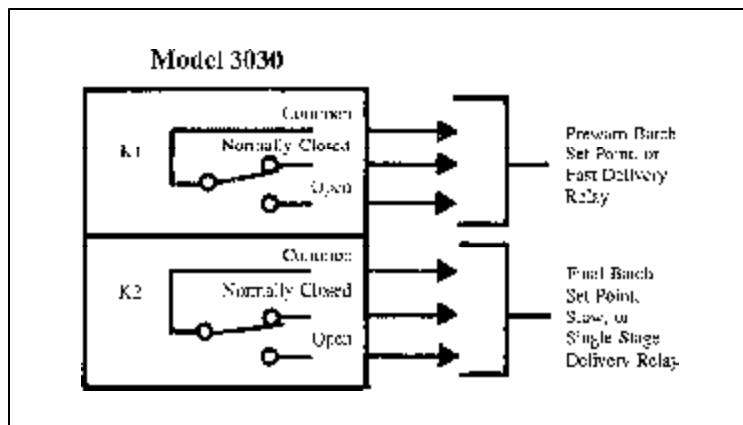
Flow input or control input using switch contact closure



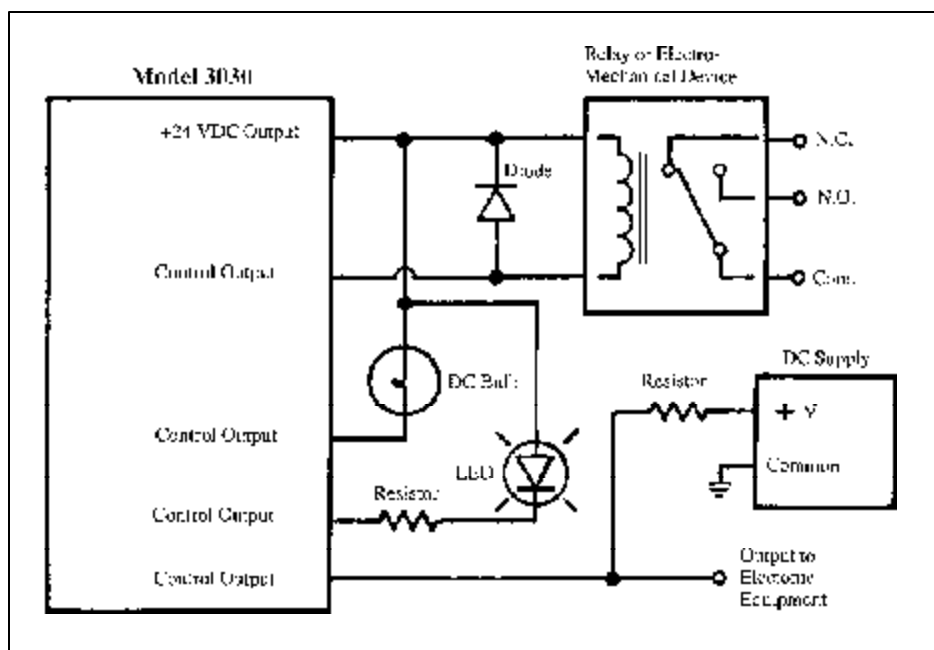
Flow input or control input utilizing current sinking open-collector npn transistor



Flow input or control input using current-seeking npn transistor with pull-up resistor



Batch relay connection and operation



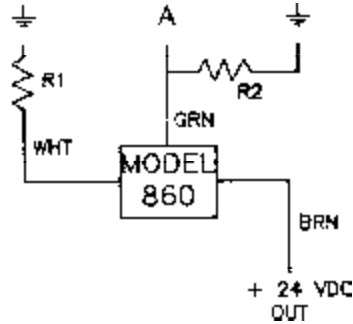
Control output application examples

# Model 3030 Controller - Indicator - Totalizer

## Niagara Transmitter Wiring

- |                   |                    |
|-------------------|--------------------|
| <b>Model 840C</b> | <b>Model 3030</b>  |
| black _____       | Input A            |
| brown _____       | Input Common ⚡     |
| white _____       | No connection      |
| <b>Model 860</b>  | <b>Model 3030</b>  |
| green _____       | Input A (see note) |
| white _____       | Input Common ⚡     |
|                   | (see note)         |
| brown _____       | +24 V output       |

**Note:** Place a 1200 to 1500 ohm resistor (3/4 watt or greater) in series with the white wire as R1. Place a 1500 ohm resistor between the green wire and ground as R2. In some cases, it may be necessary to substitute for R2 a resistor in the range of 1200 to 2000 ohms. Input speed for Model 860 must be 7500 Hz.



- |                          |                     |
|--------------------------|---------------------|
| <b>Model 1006</b>        | <b>Model 3030</b>   |
| <b>Pre-amp</b>           |                     |
| 1 _____                  | Input A             |
| 2 _____                  | +24 V Output        |
| 3 _____                  | Input Common ⚡      |
| <b>Model 1050</b>        | <b>Model 3030</b>   |
| V In _____               | +24 V Output        |
| P Out _____              | Input A             |
| Ground _____             | Input Common ⚡      |
| <b>R-11 or R-12</b>      |                     |
| <b>with reed switch,</b> |                     |
| <b>R-15, R-39</b>        | <b>Model 3030</b>   |
| white _____              | Input A             |
| black _____              | Input Common ⚡      |
| <b>R-11 or R-12 with</b> |                     |
| <b>micro-switch</b>      | <b>Model 3030</b>   |
| blue _____               | Input A             |
| black _____              | Input Common ⚡      |
| <b>R-22A</b>             |                     |
| <b>Square wave</b>       | <b>Model 3030</b>   |
| black _____              | Input A             |
| white _____              | Input Common ⚡      |
| red _____                | V out               |
|                          | (see note at R-38.) |
| <b>R-22A Form A</b>      | <b>Model 3030</b>   |
| black _____              | Input A             |
| black _____              | Input Common ⚡      |
| green _____              | no connection       |
|                          | (See note at R-38.) |

**R-25**                      **Model 3030**  
T1 \_\_\_\_\_ Common ⚡  
T2 \_\_\_\_\_ +24 V Output  
T3 \_\_\_\_\_ no connection  
T4 \_\_\_\_\_ Input A

**R-37A**                    **Model 3030**  
red     \_\_\_\_\_ +24 V Output  
black \_\_\_\_\_ Input Common ⚡  
white \_\_\_\_\_ Input A

**R-38**                      **Model 3030**  
black \_\_\_\_\_ Input Common ⚡  
red     \_\_\_\_\_ See notes below  
white \_\_\_\_\_ Input A

**Notes:** Follow these steps for proper hookup for the R-22A and R-38.

- Use a 15 V regulator (7815 or LM340T15 in a TO-220 package) to obtain power for the R-38.
- Connect pin 1 (regulator input) of the regulator to the +24 V output of the Model 3030.
- Connect pin 2 (regulator ground) of the regulator to Common on the Model 3030.
- Connect pin 3 (15 V output) of the regulator to the red wire of the R-38.
- Connect the black wire of the R-38 to the Input Common terminal of the Model 3030.

**TR-01-1, TR-06-1,  
TR-13-1, TR-14-1,  
TR-20-1**                **Model 3030**  
white \_\_\_\_\_ Input A  
red     \_\_\_\_\_ +24 V Output  
black \_\_\_\_\_ Input Common ⚡

**Mag Meter**              **Model 3030**  
P Out  
(0 to 10 K Hz) \_\_\_\_\_ Input A  
Ground \_\_\_\_\_ DC Common ⚡

## ***OPERATION***

The Model 3030 can be thought of as three separate instruments in a single case. They act mostly independent of each other and their functions are easily understood with this in mind.

### **Rate Meter**

The Rate Meter provides six-digit indication and three alphabetical characters for rate units such as gpm, lps, etc. A decimal point may be positioned anywhere within the six digits. The rate meter provides a rate smoothing operation which provides dynamic averaging of pulsating flow rates. Smoothing provides software dampening of incoming flow signals.

There are two set points for signaling the high and low flow rate conditions. An open-collector npn transistor switches to ground upon set point activation. The set points may act in three modes. They may follow the flow rate, be latched, or activate for a specified amount of time (select from 0.1 to 999.9 seconds). When set up for latched or timed operation, the set points may be reset from the front panel reset key or by wired control input. The rate low set point may

## ***Model 3030 Controller - Indicator - Totalizer***

be programmed to become enabled after a batch start time delay. This allows flow to get up to speed without causing an alarm.

### **Totalizer**

The Model 3030 has a ten digit totalizer to count flow units or batches. A decimal point may be positioned within the ten digits. The totalizer may be reset from the front panel or by a wired control input.

The totalizer uses a single control output for one of two possible functions. You may program the output mode you wish to use. One output is a scaled pulse that may be used for a remote totalizer or as input to another computer. The pulse width may be specified from three choices. A certain output frequency must not be exceeded for each choice. Longer pulse widths dictate a slower output frequency. The second totalizer control output possibility is for the totalizer set point. If chosen, this output will activate when the totalizer reaches a preset value. The output may be latched or timed and may be reset from the front panel or from wired control input. This function may be used to terminate a batch operation if necessary.

### **Batch Controller**

Single or dual stage batch control may be performed with the 3030 for fast and slow delivery. Batch sizes may be specified to six digits. Batch counter indication may be set for the actual count (count up) or remaining count (count down) operation. The first stage relay may be set up to act either as a prewarn (drop out at X number of counts before the end of a batch) or a preset (drop out at an exact point in the batch). An auto-recycle feature may be selected for no operation, immediate, or timed recycle after a batch completion. The period may be selected between 0.1 and 999.9 seconds.

A batch size limit may be set to help prevent errors. Another safety feature is an overrun set point that may be selected to signal if a batch has gone beyond a predetermined amount after the final batch shutdown has occurred. If the overrun is set to zero, the output may be used to signal batch completion. The overrun output may operate latched or as a time-out.

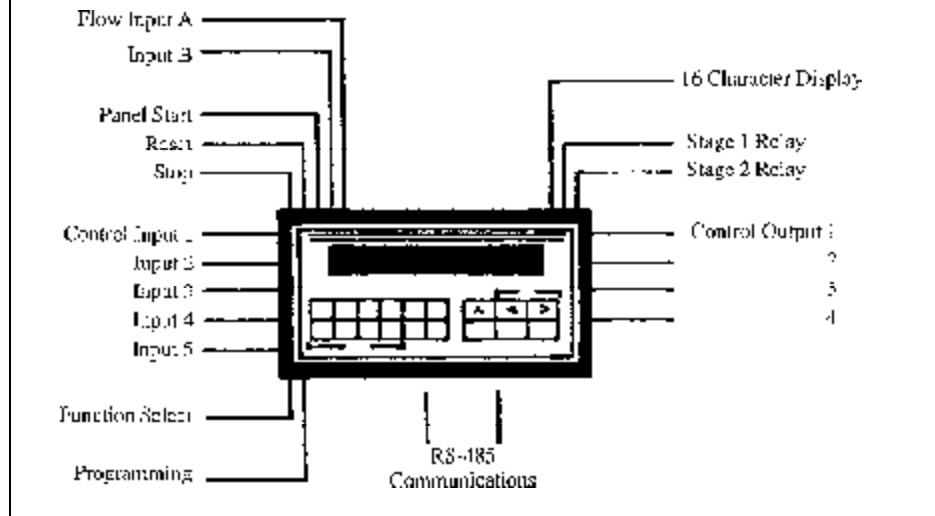
Front panel Start, Reset, and Stop operator keys allow control of the batching process. Switches may be wired to the unit to enable operation of the unit from a remote location. A fourth remote switch for batch jog may also be wired. Front panel start and reset keys may be selectively locked as a safety feature when remote operators are desired for primary control. The front panel Start and Reset keys may be selectively disabled. The front panel stop key will always be active.

The batch controller contains a "hide overrun" option that may be selected for use with repetitive batching applications. With the hide overrun feature selected, batch counts that are received after the batch shutdown are not displayed. Counts beyond the end of the batch are automatically added into the beginning of the next batch. This feature is only recommended for batching systems that have very repetitive shutdown characteristics such as valve closing time, line pressure, and other factors.

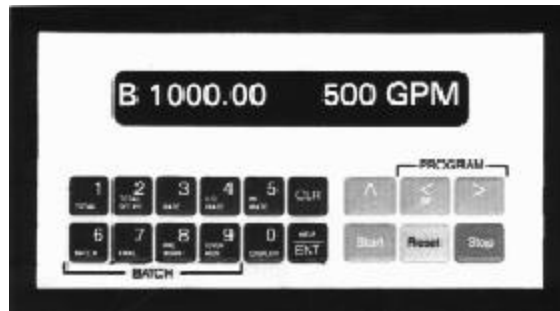
The Model 3030 may also be programmed to start at a predetermined batch offset value. Use of this feature is also application dependent. This feature is not recommended for auto-recycling applications because the batch only starts at the offset quantity following a manual reset.

The totalizer may work in conjunction with the batch controller if the "auto stop" feature of the totalizer is selected. If selected and the totalizer reaches the totalizer set point value, the batching process will stop. The batch process may not be restarted until either a new totalizer set point is entered, or the totalizer is reset. These functions may be programmed to happen automatically, if desired, through specific control outputs and wired control inputs.

### Input-Output Diagram



### Front Panel Value Display



| Key | Key Label     | Function/Description                                       |
|-----|---------------|--|
| 1   | Total         | Totalizer count value                                      |
| 2   | Total Set Pt. | Totalizer set point value                                  |
| 3   | Rate          | Flow rate value  |
| 4   | Lo Rate       | Flow rate low set point value                              |
| 5   | Hi Rate       | Flow rate high set point value                             |
| 6   | Batch         | Current active batch count value                           |
| 7   | Final         | Final batch set point value (second/final stage shut down) |
| 8   | Prewarn       | Batch prewarn or preset value (first stage shut down)      |
| 9   | Overrun       | Batch overrun set point value                              |
| 0   | Display       | Dual display values  |

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### Hidden Values

| Keys      | Function                     | Description  |
|-----------|------------------------------|--|
| ^, then 1 | K factor                     | Pulses input per unit volume value.  |
| ^, then 2 | Calculated kmf hi            | Portion greater than or equal to one.  |
| ^, then 3 | Calculated kmf lo            | Portion less than one. Values may be added to "unit" volume per "limit" or the reciprocal of the K factor.             |
| ^, then 4 | R factor                     | Rate multiplier.   |
| ^, then 5 | Batch limit                  | Value that has been programmed in that an entered batch quantity cannot exceed as a safety or error preventing device. |
| ^, then 6 | Batch offset                 | Preset value at which the batch counter may start.   |
| ^, then 7 | Calculated prewarn set point | Value is the point in a batch where the first stage will shut off.   |
| ^, then 8 | Batch & Overrun              | The volume at which the overrun set point will activate.   |
| ^, then 0 | Software version             | Lets the customer and Niagara factory personnel know the version of software used.                                     |

### Display Key

When the Display key is pressed, two values are simultaneously displayed. An abbreviated label will accompany the value displayed. To see the full label, momentarily press the **DP** key or < left arrow and the full labels of the two display items will be shown for about a second. The operator may choose from any of the normal display values listed on page 8 for dual display except the totalizer set point. To change the entities for display, press and hold the **DP** key until the left half of the display begins to flash. Then, press the ^ up arrow key until the desired entity is displayed. Now, press the > right arrow key to select the right half of the display and press the ^ key until the desired entity is displayed. Press the **Display** key to end the dual function display specification routine.

**Note:** It is recommended that when the totalizer is selected for dual display, it should be selected for the left side of the display. If the magnitude of the total becomes over seven digits, the "T" header will not be displayed. It is possible that the display be completely full of numbers without spaces if the totalizer reaches ten digits and the right half display selection is showing six digits. It is recommended that the totalizer be reset before reaching ten digits, or the right half display entity be restricted to four digits if display of both entities is desired.

There are some other "hidden values" that may be displayed from the front panel. The reason they are termed "hidden" is because they are not labeled. To see the hidden value, press the ^ key and immediately press the number key that corresponds to the parameters desired.

### Changing Set Point Values

Set point values may be easily changed from the front panel. First, press the desired function key as if to view the set point. To change the value, press the **CLR** key, enter the new value using the number keys, then press the **ENT** key. If you change your mind before pressing the **ENT** key, just press the **CLR** key and the original value will be retained.

It is possible to "lock out" the set point values from being changed from within the program mode. See the Programming Section.

**Control Functions**

| Key          | Batch   | Rate  | Total   |
|--------------|---|---|---|
| <b>Start</b> | <ul style="list-style-type: none"> <li>• Disable</li> <li>† Only Start</li> <li>• Reset Batch Count &amp; Start Batch</li> </ul>  |   | <ul style="list-style-type: none"> <li>† None</li> <li>• Reset Totalizer Count</li> <li>• Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |
| <b>Reset</b> | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Batch Count</li> <li>• Unlatch Overrun Output</li> <li>† Reset Batch Count &amp; Unlatch Overrun Output</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> <li>† Unlatch Hi/Lo Outputs</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Totalizer Count</li> <li>† Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |
| <b>Stop</b>  | <ul style="list-style-type: none"> <li>• Only Stop</li> <li>† Stop Batch &amp; Unlatch Overrun Output</li> </ul>  | <ul style="list-style-type: none"> <li>• None</li> <li>† Unlatch Hi/Lo Outputs</li> </ul> |   |

| Control Input | Batch  | Rate  | Total   |
|---------------|--|---|---|
| 1             | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Batch Count</li> <li>† Start</li> <li>• Reset Batch Count &amp; Start</li> <li>• Stop</li> <li>• Unlatch Overrun Output</li> <li>• Reset Batch Count &amp; Unlatch Overrun Output</li> <li>• Jog</li> </ul> | <ul style="list-style-type: none"> <li>† None</li> <li>• Unlatch Hi/Lo Outputs</li> </ul> | <ul style="list-style-type: none"> <li>† None</li> <li>• Reset Totalizer Count</li> <li>• Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |
| 2             | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Batch Count</li> <li>• Start</li> <li>• Reset Batch Count &amp; Start</li> <li>• Stop</li> <li>• Unlatch Overrun Output</li> <li>† Reset Batch Count &amp; Unlatch Overrun Output</li> <li>• Jog</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> <li>† Unlatch Hi/Lo Outputs</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Totalizer Count</li> <li>† Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |
| 3             | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Batch Count</li> <li>• Start</li> <li>• Reset Batch Count &amp; Start</li> <li>† Stop</li> <li>• Unlatch Overrun Output</li> <li>• Reset Batch Count &amp; Unlatch Overrun Output</li> <li>• Jog</li> </ul> | <ul style="list-style-type: none"> <li>† None</li> <li>• Unlatch Hi/Lo Outputs</li> </ul> | <ul style="list-style-type: none"> <li>† None</li> <li>• Reset Totalizer Count</li> <li>• Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |
| 4             | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Batch Count</li> <li>• Start</li> <li>• Reset Batch Count &amp; Start</li> <li>• Stop</li> <li>• Unlatch Overrun Output</li> <li>• Reset Batch Count &amp; Unlatch Overrun Output</li> <li>† Jog</li> </ul> | <ul style="list-style-type: none"> <li>† None</li> <li>• Unlatch Hi/Lo Outputs</li> </ul> | <ul style="list-style-type: none"> <li>† None</li> <li>• Reset Totalizer Count</li> <li>• Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |
| 5             | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Batch Count</li> <li>• Start</li> <li>• Reset Batch Count &amp; Start</li> <li>• Stop</li> <li>† Unlatch Overrun Output</li> <li>• Reset Batch Count &amp; Unlatch Overrun Output</li> <li>• Jog</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> <li>† Unlatch Hi/Lo Outputs</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> <li>• Reset Totalizer Count</li> <li>† Unlatch Totalizer Output</li> <li>• Reset Totalizer Count &amp; Unlatch Totalizer Output</li> </ul> |

† Indicates default/factory programmed settings

### **Front Panel Control**

The Start, Reset, and Stop keys may be used to perform front panel control such as unlatching set point outputs, resetting counters, or performing batch control functions. A combination of functions or no function at all may be chosen from within the program mode. The table on page 6 illustrates the possible functions. The individual keys can be programmed to perform only one task under each of the three major control functions shown. To lock a function key, simply select “none” from each of the function groups for that key. The stop key will always stop a batch process.

### **Flow Inputs**

There are two terminals for flow inputs (plus associated ground terminals). Input A accepts electrical pulses from the flow meter or flow transmitter. Input B is a flow inhibit input. When Input B is connected to ground, the Model 3030 will ignore any incoming pulses on Input A. When Input B is not used or connected to a logical positive voltage (see specifications), Input A is active as normal.

### **Wired Control Inputs**

There are five wired control inputs that perform single or multiple functions similar to the Start, Reset, and Stop keys. When switched to ground, the specific function is performed. Each function may be altered through the programming menu. The table on page 10 details the function selections. An input may be assigned up to three tasks, but only one task can be assigned under each of the three control functions. The “Jog” task is an exception. An input assigned the Jog task is not allowed to be assigned additional tasks under the rate and totalizer control functions.

### **Control Outputs**

Four control outputs are available. These are open-collector npn transistors that will switch a load to ground when activated. They may be used for electro-mechanical devices such as counters or relays, turning on lamps, or used to signal an automated processing device. The maximum current sinking capability is 150 milliamps, and the maximum DC voltage is 30 volts.

| <b>Output #</b> | <b>Function</b>  |
|-----------------|--|
| 1               | Scaled totalizer pulse output<br>OR totalizer set point output |
| 2               | Batch overrun set point output                                 |
| 3               | Rate low set point output                                      |
| 4               | Rate high set point output                                     |

Note that control output 1 may either be used as a scaled totalizer pulse output or as a totalizer set point output. Having both functions simultaneously is not possible.

The totalizer set point and batch overrun set point outputs may be specified from within the program mode to have latched or timed (from 0.1 to 999.9 seconds) operation.

The rate set points have three modes of operation. One mode is for both the set points to follow the flow rate. That is, the outputs activate and deactivate as the flow rate passes above and below the set values. The two rate set points may also act independently by being latched or timed from 0.1 to 999.9 seconds.

In either case, latched or timed, an output that has been activated will remain activated as long as the condition exists. When the condition ceases to exist, the output may either time-out or be unlatched by a control input.

### **RS-485 Communications**

The Model 3030 has an RS-485 communications link for two-way communication with other computers. This link may be used to make programming changes, set point changes, query flow data, and perform control functions. There may be up to 100 Model 3030s on a single two-wire line. Each unit must have a unique identification number from 0 - 255. A single line may be up to 4000 feet long without the use of signal repeaters. The communications link is specified as RS-485 multi-drop. Baud rates of 300, 600, 1200, 2400, 4800, 9600, and 19200 are possible. Parity may be specified as space (none), even, or odd. The protocol is Opto-22 compatible. For communication command specifics, please contact your Niagara representative.

## ***PROGRAMMING***

### **Method**

The Model 3030 may be programmed by two methods. The preferred method uses a sequential menu that may be stepped through for making changes. The second method is a rapid access technique that is quicker for a simple change but requires the programming diagram to be in hand. In either case, the 3030 may request a password if an operator has specified a password during a previous programming session. The 3030 comes from the factory with no password set. See page 20 for setting a password.

### **Entering the Programming Mode**

To enter the programming mode, simultaneously press the < (left) and > (right arrows). Notice that these keys have "Program" labeled right above them.

If a password has been set, the Model 3030 will ask for it now. Enter the correct password number and press the **ENT** key. If an incorrect password is entered the message "PW ERROR" will be flashed and the unit will again ask for a password. You may try again if desired. You may leave the password entry mode and return to the run mode by again simultaneously pressing the < and > keys. If the password display is left idle without operator interaction, the unit will return to the run mode automatically after 15 seconds.

Once beyond the password entry routine (in the case that a password had been specified), "PROGRAM ?" will be displayed.

### **Rapid Access Programming Method**

Program cells may be accessed directly from the "PROGRAM ?" screen by entering the row number and the column number of the cell from the program menu diagram. See diagram on page 14. Other cells may be accessed by pressing < and > to get the "PROGRAM ?" display and entering another row and column number.

### **Sequential Menu Programming Method**

The simplest method of program access is through use of the sequential menu programming method. When using this method, once the "PROGRAM ?" display is obtained, main menu items may be selected by pressing the ^ up arrow key. These menu items all contain the word "PROG." and are sequential. See the Programming Chart. Once the main menu selection has been made, use the > and < keys to move to other submenu items and then back to the main menu. The ^ key may be used to select another main menu item. Successive > or < key pressing will pass through all the submenus for a particular main menu line until returning to the main menu item.

### **Help**

When positioned at any submenu item, the **HELP** key may be pressed and a helpful programming message will scroll across the display. When the

## ***Model 3030 Controller - Indicator - Totalizer***

message is completed, the display will return to the submenu item. If you do not want to read the entire message, pressing any key will end the message and the submenu item display will return.

### **Exiting Program Mode**

When programming is completed, you may return the Model 3030 to the running mode by simultaneously pressing the < and > keys to obtain "PROGRAM ?." Then, press the **Reset** key to exit the programming mode.

## ***PROGRAM MENU DESCRIPTIONS***

### **PROG. CALIBRATION**

#### **K Factor**

The K factor is the ratio of the number of input pulses from the flow meter or transmitter per unit of volume.

Example: 2.485 pulses per gallon

The value entered as the K factor affects the batch controller, totalizer, and rate meter calibrations. One way to increase display resolution is to change the K factor by a multiple of 10. Example: 0.2485. If this is done, the decimal point in both the batch control menu and the rate meter menu should be moved one place to the left. Also, if the totalizer is counting flow, instead of batches, the decimal point in the totalizer menu should be moved one place to the left. See PROG. TOTALIZER, PROG. RATEMETER, and PROG. BATCH CONTROL below.

Note: The totalizer scaled pulse output will also be 10 times greater.

Operation: Use the **CLR** key to enable a new entry. Use the **0 - 9**, **DP** (decimal point), and **ENT** keys to enter a new K factor.

#### **Rate Multiplier**

The rate multiplier is a factor used for scaling the pulse input rate into a time unit for flow rate indication such as "per minute" or "per day." To calculate the rate multiplier factor required for a unit, multiply the full scale flow rate by the K factor and divide by the full scale frequency.

Example: A given meter has a flow range of 0 - 10 gpm and a K factor of 570 pulses per gallon. First, calculate the frequency (pulses per second) of the flow input signal at the full scale flow rate.

FS Freq =

$$\frac{10 \text{ gal}}{1 \text{ min}} \times \frac{570 \text{ pulses}}{1 \text{ gal}} \times \frac{1 \text{ min}}{60 \text{ sec}} = \frac{95 \text{ pulses}}{\text{sec}}$$

Next, multiply the full scale flow rate by the K factor and divide by the full scale frequency.

$$R_M = (\text{FS flow rate}) \times (\text{K factor}) / (\text{FS Freq})$$

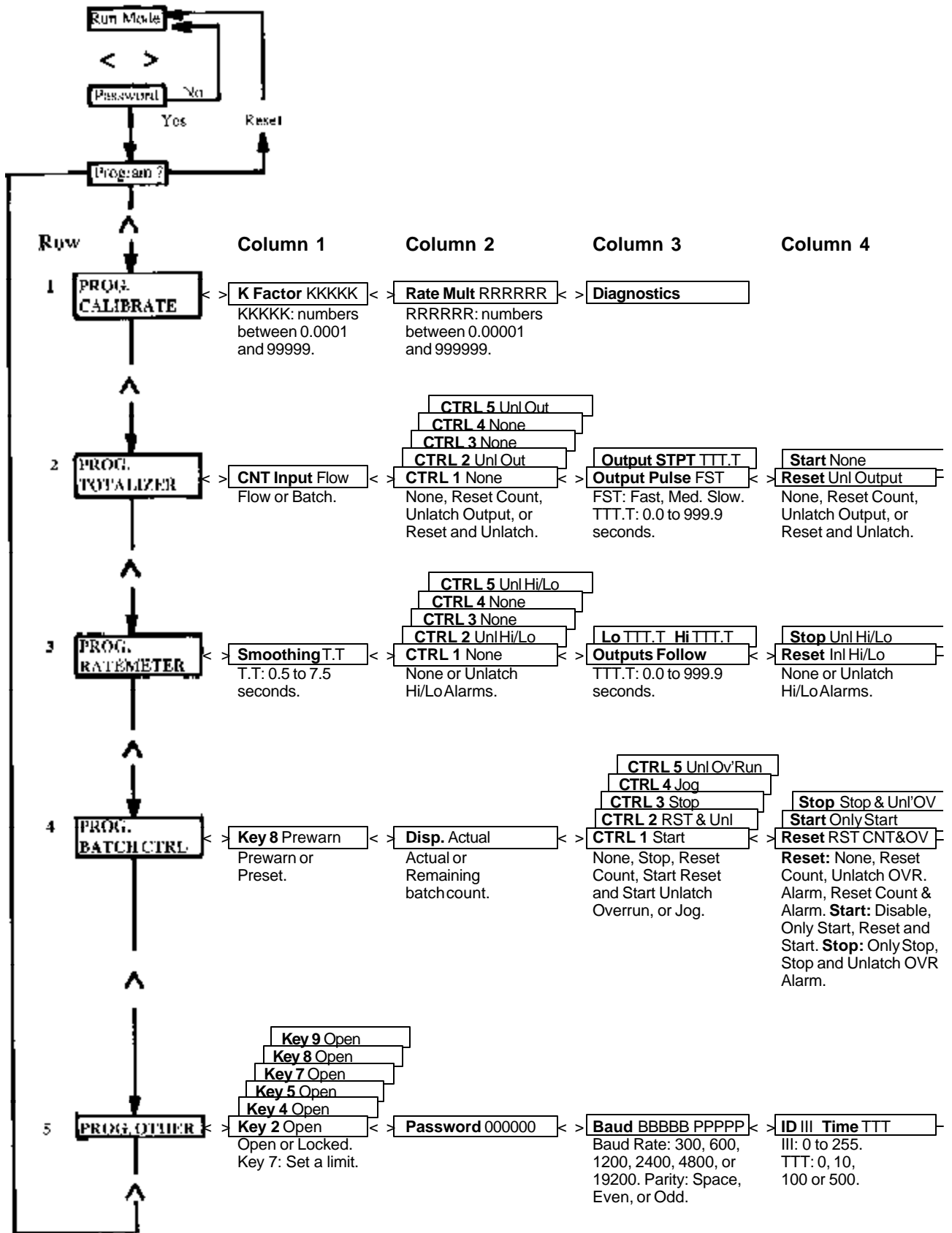
or  
$$R_M = 10 \times 570 / 95 = 60$$

The readout will be in unitary gallons and unitary gpm. To obtain higher resolution for the rate meter, change  $R_M$  to 600 instead of 60. Change the rate meter decimal point to 00000.0 instead of 000000. Note that the high and low rate set point decimals will also shift a place to the left. These values may have to be re-entered. See PROG. RATEMETER below.

Operation: Use the **CLR** key to enable a new entry. Use the **0 - 9**, **DP**, and **ENT** keys to enter a new rate multiplier.

*Continued on page 16*

PROGRAMMING CHART



# Model 3030 Controller - Indicator - Totalizer

Column 5

Column 6

Column 7

Column 8

Column 9

— **Dec. Pt.** 000000 < > **Auto Stop** No  
No or Yes

— **Dec. Pt.** 000000 < > **Lo Alarm Delay** T.T  
T.T: 0.0 to 9.9 seconds. < > **Rate at Zero** TT  
TT: 1 to 15 seconds. < > **Rate Header** GPM  
G, P, M: any character or a blankspace.

— **Dec. Pt.** 000000 < > **Auto Recycle** TTT.T  
TTT.T: 0 to 999.9 seconds. < > **Auto Recycle** No < > **Offset** 000000 < > **Hide Overrun** No  
No or Yes < > **Overrun Out** TTT.T  
TTT.T: 0.0 to 999.99 seconds.

— **Speed** 400 Hz Max  
Flow input speed:  
40, 400, or 7500  
Hz Max.

### **Diagnostics**

Two items may be tested when the diagnostics are run — the display and the computer itself. The user may check for missing character segments in the display. By pressing the ^ key, all "8"s and decimal points should be displayed. Press the ^ key again and all "\*"s will be displayed. Again, the user should check for missing segments. Pressing the ^ key again will start the computers self-diagnostics test. Any errors it finds will be flashed on the display.

Operation: Press the ^ key 3 times to cycle through the diagnostic tests.

### **PROG. TOTALIZER**

#### **Count Input Source**

The totalizer may be used to count flow units or batches.

Operation: Use the ^ key to select the count source for the totalizer.

#### **Control Inputs** (wired)

**Note:** These are factory preprogrammed and usually do not require changes for most applications.

The totalizer functions of the five wired control inputs may be specified. Selection for each input may be specified from the list of: none, reset totalizer count, unlatch totalizer set point output, and reset totalizer count and unlatch totalizer set point output. See table page 10.

Operation: Use the **1 - 5** keys to select a control input. Use the ^ key to select the totalizer function associated with this input.

#### **Output Pulse**

Totalizer output selection: If fast, medium, or slow is selected, the output will be a scaled totalizer output pulse. For fast pulse, the pulse width is 125 microseconds and the maximum output frequency is 1500 pulses per second.

For medium pulse, the pulse width is 2 milliseconds and maximum output frequency is 200 pulses per second. The slow pulse width is 50 milliseconds and 10 pulses per second is the maximum frequency.

If "Output STPT" is selected, the output will relate to the totalizer set point. If the set point mode is used, a time of 0.0 seconds will specify latched operation. Any entry of 0.1 to 999.9 will specify an output time-out of that many seconds.

Operation: Use the ^ key to select the function of the totalizer output. If set point is selected, use the **CLR** key to enable entry of a new time-out. Use the **0 - 9** and **ENT** keys to enter the time-out value of the output.

#### **Reset and Start Keys**

**Note:** These are factory preprogrammed and usually do not require changes for most applications.

The front panel Reset and Start keys may perform multiple functions or no functions for the totalizer. These functions include reset totalizer count, unlatch totalizer set point output, reset totalizer count and unlatch totalizer set point output, and none. See table page 10.

Operation: Use the **Reset** or **Start** key to select which key to program and the ^ key to select the function of that key.

#### **Decimal Point**

The decimal point position of the totalizer may be selected using this display. If the totalizer has been selected to count batches instead of flow units, it may not make sense to specify a decimal point position at all.

Operation: Use the ^ key to select the decimal point location for the totalizer.

### **Auto Stop**

The “auto stop” function may be specified to shut down a batch process when the totalizer reaches the totalizer set point value.

Operation: Use the ^ key to select whether or not the totalizer is in the auto stop mode.

## **PROG. RATEMETER**

### **Smoothing**

A built-in dynamic averager performs software dampening. With this, a stable reading of flow rate may be obtained from a pulsating flow system. A smoothing factor of 0.5 to 7.5 may be set in 0.5 increments. By setting the smoothing factor at 0.5, no dampening is performed. A smoothing factor of 7.5 provides a 7.5 second time delay for 100% display settling after a change in flow rate. Instantaneous rate readings are taken and averaged to produce a single reading to be displayed. With each rate update, the oldest reading will be dropped and a new reading will be incorporated into the average.

Operation: Use the ^ key to select a new rate smoothing time.

### **Control Inputs** (wired)

**Note:** These are factory preprogrammed and usually do not require changes for most applications.

The rate meter functions of the five wired control inputs may be specified in this section. Selection for each input may be specified as either none, or unlatch rate hi/lo set point outputs. See table on page 10.

Operation: Use the **1 - 5** keys to select a control input. Use the ^ key to select the rate meter function associated with this input.

### **Outputs Follow**

The high and low flow rate set points may operate three different ways. They may follow the flow rate, be latched, or be timed. For latched operation, set the time-out period for 0.0 seconds. For timed, set the time-out from 0.1 to 999.9 seconds. The output will persist until after the responsible conditions cease and the time-out period has expired or until the output is unlatched.

Operation: Use the ^ key to select whether the rate outputs follow the rate or are timed. If timed, use the < and > keys to select either the lo or hi rate output. Use the **CLR** key to enable a new entry. Use the **0 - 9** keys and **ENT** to enter a new output time. The output is latched if a time of 0.0 is entered.

### **Reset and Stop Keys**

**Note:** These are factory preprogrammed and usually do not require changes for most applications.

The front panel **Reset** and **Stop** keys may perform either an unlatching of the rate set point outputs or no function at all. See table on page 10.

Operation: Use the **Reset** or **Stop** key to select which key to program and the ^ key to select the function of that key.

### **Decimal Point**

The decimal point position of the rate meter may be selected using this display.

Operation: Use the ^ key to select the decimal point location for the rate meter.

### **Lo Alarm Delay**

During batching operations, it is likely that the flow will completely stop between batches. This will normally cause the rate low set point output to turn on. To prevent this, the low alarm delay may be set for a time delay. The time

delay should allow for flow conditions to reach normal flow rates before enabling the rate low set point. Upon batch completion, the rate low set point will again be disabled. The set point will not be enabled again until the batch has been restarted and the delay period has expired.

Operation: Use the **CLR** key to enable a new entry. Use the **0 - 9** and **ENT** keys to enter a new low rate set point output delay time.

### Rate At Zero

In absence of the flow pulse input, the rate at zero is the period that the rate meter will show the last legitimate flow reading before showing a zero flow rate. The period may be set from 1 to 15 seconds. An ideal application to use this function would be when flow pulse input rates are expected to be very slow.

Example: A rate at zero set to 15 would be useful when the pulse input rate is expected to be as low as 1 pulse every 10 seconds. An expected low pulse rate of 1 pulse every 2 seconds may warrant a rate at zero setting of 3 to 5 seconds.

Operation: Use the **CLR** key to enable a new entry. Use the **0 - 9** keys and **ENT** to enter a new rate zero time.

### Rate Header

Three alphabetical characters and a blank character may be used to label the flow rate display with engineering units.

Operation: Use the **>** and **<** keys to select which location to program. Use the **^** key to select the character for that location.

## PROG. BATCH CTRL

### Key 8 Prewarn (or Preset)

You may specify how the stage 1 batch relay is to act upon the value set in key 8 labeled "Prewarn." If "Prewarn" is specified, the stage 1 relay (K1) will drop out when the batch count is at the "final minus prewarn" quantity. If "Preset" is specified, the stage 1 relay will drop out when the batch count is equal to the entered preset value.

Operation: Use the **^** key to select the function of **key 8**.

### Display Actual (or Remaining)

Selection of "display actual" will cause the batch counter to start counting at zero and count upward towards the final batch quantity. Selection of "display remaining" will cause the batch counter to start counting at the final batch quantity and count down towards zero.

Operation: Use the **^** key to select if the batch display shows the actual value or the amount remaining to the end of the batch.

### Control Inputs (wired)

**Note:** These are factory preprogrammed and usually do not require changes for most applications.

The batch functions of the five wired control inputs may be specified. Selection for each input may be specified from the list of: none, reset batch count, start, reset batch count and start, stop, unlatch overrun set point output, and jog. See table on page 10.

Operation: Use the **1 - 5** keys to select a control input. Use the **^** key to select the batch function associated with this input.

### **Reset, Start, and Stop Keys**

**Note:** These are factory preprogrammed and usually do not require changes for most applications.

The front panel Reset, Start, and Stop keys can perform several different functions for the batch controller. The Reset key functions may be: none, reset batch count, unlatch batch overrun set point output, or reset batch count and unlatch batch overrun set point output. The Start key functions may be: none, only start, or reset batch count and start. The Stop key functions may be: only stop, or stop and unlatch overrun set point output. See table on page 10.

Operation: Use the **Reset**, **Start**, or **Stop** key to select which key to program and the ^ key to select the function of that key.

### **Decimal Point**

The decimal point position of the batch controller may be selected using this display.

Operation: Use the ^ key to select the decimal point location for the rate meter.

### **Auto Recycle**

The batch control process may be specified for a single run or to recycle automatically. If automatic recycling is specified, a time should be entered for the recycle delay period. A period of 0.0 seconds denotes immediate recycling. Delay periods of 0.1 to 999.9 seconds may be specified.

Operation: Use the ^ key to select whether or not the batch counter is to auto-recycle. If it is, use the **CLR** key to enable entry and use the **0 - 9** and **ENT** keys to enter the delay time.

### **Offset**

An offset value may be programmed so the batch counter starts at a value besides zero. Example: A 55 gallon drum contains 4 gallons of solution from a previous process. The current batch process requires 51 gallons of water to be added to dilute the solution. If an offset of 4 is entered, a final batch quantity of 55 may be entered to show a filled drum.

**Important:** The batch count will start at the offset value after a manual batch count reset only. Therefore, the offset function is not recommended for use in conjunction with the batch Auto-Recycle mode.

Operation: Use the **CLR** key to enable a new entry. Use the **0 - 9** and **ENT** keys to enter a new offset.

### **Hide Overrun**

In most batching applications, the batch relays control a delivery value. When the batch is complete, the relay signals the valve to close. Unless the valve closes very fast, some extra fluid will be delivered while the valve is closing. The "hide overrun" function causes the extra delivery quantity to be transparent. That is, the batch counter will stop at the final batch set quantity. The extra counts that are unseen will be automatically added in to the next batch. The batch deliveries will balance out to the set batch quantity without adjustment of batch quantity after the first batch if the valve closings and delivery rates are consistent.

Operation: Use the ^ key to select whether or not to display the overrun.

### **Overrun Output**

The overrun set point output operates on a latched or a timed basis. An entry of 0.0 denotes latched operation. An entry of 0.1 to 999.9 denotes a time-out period in seconds. When an overrun quantity of zero has been specified from the front panel, the overrun output will activate upon batch completion.

Operation: Use the **CLR** key to enable a new entry. Use the **0 - 9** and **ENT** keys to enter a new time-out.

## **PROG. OTHER**

### **Key 2 Open** (Also, keys 4, 5, 7, 8, and 9)

Set point values may be locked in the program mode to prevent operator changes in the normal running mode. This prevents unauthorized persons from changing the set points in critical control applications. If denoted as "open," the key values will be unprotected in the run mode. Key 2 corresponds to the totalizer set point. Keys 4 and 5 correspond to the rate low and high set points, respectively. Keys 7, 8, and 9 correspond to the final batch quantity, the prewarn or preset batch quantity, and the overrun set point, respectively. A batch limit may be specified with key 7. This is a safety feature to prevent the entering of larger than anticipated batch quantities.

Operation: Use the **2, 4, 5, 7, 8, or 9** key to select which set point mode to program. Use the **^** key to select whether or not the selected set point is locked. The batch control point may also be limited. Press key **7**. Use the **^** key to display the limit. Use the **CLR** key to enable entry and use the **0 - 9** and **ENT** keys to enter a new limit.

### **Password**

A password may be specified for the next entry into the programming mode. A password of zeros (000000) means that no password is required for program mode entry. Please remember your password!

Operation: Use the **CLR** key to enable entry. Use the **0 - 9** and **ENT** keys to enter a new password.

### **Baud - Parity**

The baud and rate parity must be specified when using the RS-485 communications link. The baud rate should be chosen from 300, 600, 1200, 2400, 4800, 9600, or 19200. The parity may be space, even, or odd.

Operation: Use the **CLR** key to enable entry. Use the **0 - 9** and **ENT** keys to enter the communication baud rate. Use the **^** key to select odd, even, or space parity.

### **ID - Time**

The Model 3030's identification number must be set whenever using the RS-485 communication link. This must be a number between 0 and 255. No two units on the same link may have the same ID. Also, the minimum communication response time for the unit must be specified. It may be selected from 0, 10, 100, or 500 milliseconds. A longer time is normally given for non-time-critical applications.

Operation: Use the **CLR** key to enable entry. Use the **0 - 9** and **ENT** keys to enter the unit identity number from 0 to 255. Each unit on the communication link must have a unique number. Use the **^** key to select the minimum communication response time.

### **Input Speed**

The pulse frequency of the flow input must be specified. Three choices are available. These are fast (7500 Hz max.), medium (400 Hz max.), and slow (40 Hz max.). The fast speed is used only for quick electronic pulses. The slow speed is recommended for contact closure inputs. Please check the specifications for the minimum allowable pulse width for each speed.

Operation: Use the **^** key to select the count input speed.

### ***SPECIFICATIONS***

#### **Models Available**

Panel mount – 115 V AC  
Panel mount – 230 V AC  
Panel mount kit – 115 V AC  
Panel mount kit – 230 V AC  
Wall mount – 115 V AC  
Wall mount – 230 V AC

#### **Flow inputs**

Require npn current sinking or contact closure to ground. Internal 5.8K ohm pull-up resistor to 5 V DC.

Voltage low: 0 - 2.2 V DC; high: 2.8 - 24 V DC

High speed: 0 - 7500 Hz; min. pulse width: 50 microseconds

Med. speed: 0 - 400 Hz; min. pulse width: 1.5 milliseconds

Low speed: 0 - 40 Hz; min. pulse width: 10 milliseconds

**Input A:** flow input

**Input B:** flow input inhibit (flow input ignored when pulled low)

**Front panel controls:** push button controls (may be locked out)

#### **Start\*:**

Batch controller: disabled, only *start*, or reset batch count and start;

Rate meter: (no function)

Totalizer: *none*, reset totalizer count, unlatch totalizer set point output, or reset totalizer count and unlatch totalizer set point output

#### **Reset\*:**

Batch controller: none, reset batch count, unlatch batch overrun set point output, or *reset batch count and unlatch batch overrun set point output*;

Rate meter: none, or *unlatch rate hi/lo set point outputs*;

Totalizer: none, reset totalizer count, *unlatch totalizer set point output*, or reset totalizer count and unlatch totalizer set point output

#### **Stop\*:**

Batch controller: only stop, or *stop and unlatch batch overrun set point output*;

Rate meter: none, or *unlatch rate hi/lo set point outputs*

Totalizer: no function

Note\*: Where more than one function is available, the function that is italicized is the program default. It is possible to change the function through the program menu.

**Control inputs:** contact closure or npn transistor pull down to ground.

impedance: 5.8 K ohm pull-up resistor to 5 V DC

low: 0 - 1.0 V DC; high: 3.5 - 24 V DC

response: min. low 30 millisc.; min. high 30 millisc.

- Input 1** Batch start
- 2** Reset batch count and unlatch batch overrun set point output, unlatch rate hi/lo set point outputs, and unlatch totalizer set point output
- 3** Batch stop
- 4** Batch jog
- 5** Unlatch batch overrun set point output, unlatch rate hi/lo set point outputs, and unlatch totalizer set point output

## *Model 3030 Controller - Indicator - Totalizer*

Note: The previous input control functions are the default program functions. Programmable selections available are:

Batch controller: none, stop, reset batch count, start, reset batch count and start, unlatch batch overrun set point output, reset batch count and unlatch overrun set point output, and jog

Rate meter: none, and unlatch rate hi/lo set point outputs

Totalizer: none, reset totalizer count, unlatch totalizer set point output, and reset totalizer count and unlatch totalizer set point output

**Power supply:** 115 V AC, 50/60 Hz. 0.2 A or 18 - 27 V DC, 0.4 A max., 6 W max. (230 V AC or 18 - 27 V DC version available)

**Power output:** 24 V DC  $\pm 5\%$  at 100 mA max. for sensors and peripherals when supplied with AC power input only

### **Rate meter**

K factor: 0.0001 to 99999

Rate multiplier: 0.00001 to 999999

Accuracy:  $\pm 0.05\%$

Rate smoothing: designate 0.5 to 7.5 second dynamic averaging in 0.5 second increments

Rate update: 0.5 seconds

**Relay outputs:** Form C (spdt), 5 A resistive, 240 V AC Relay 1: Fast delivery (batch prewarn or preset quantity) Relay 2: Slow delivery (final batch quantity)

**Control outputs:** npn trans. (150 mA max., 30 V DC max.)

**Output 1** Scaled totalizer pulse output with designated pulse width

High speed: 1500 Hz max.; 125 microsecond pulse width

Med. speed: 200 Hz max.; 2 milliseconds pulse width

Low speed: 10 Hz max.; 50 millisecond pulse width

OR totalizer set point output

**Output 2** Overrun set point output

**Output 3** Low rate set point output

**Output 4** High rate set point output

Note: Rate hi/lo set point output operations may either follow the flow, be latched, or be timed from 0.1 to 999.9 seconds. The batch overrun set point output and the totalizer set point output operations may be either latched or timed from 0.1 to 999.9 seconds.

### **Communications**

Type: RS-485 multidrop

Baud: 300, 600, 1200, 2400, 4800, 9600, or 19200

Parity: space, even, or odd

Protocol: Opto-22 compatible

**Wiring terminals:** 14 AWG; detachable

### **Environmental**

Temperature:

Operating: 32 to 131°F (0 to 55°C)

Storage: -40 to 158°F (-40 to 70°C)

Humidity: 0 to 85% RH noncondensing

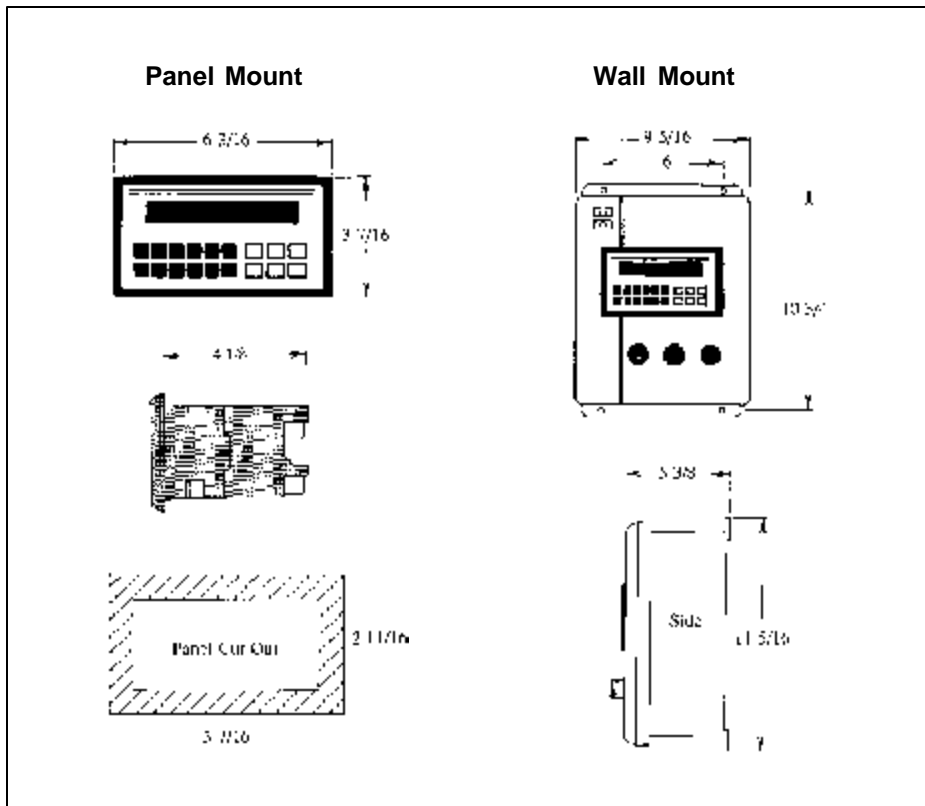
Enclosure:

Panel mount: keypad is NEMA 4X with gasket

Wall mount: enclosed, front panel, and push buttons are NEMA 4X

# Model 3030 Controller - Indicator - Totalizer

## DIMENSIONS







***Model 3030 Controller - Indicator - Totalizer***



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Internet: [www.aaliant.com](http://www.aaliant.com)

E-mail: [sales@aaliant.com](mailto:sales@aaliant.com)

A  Product Line

M521 Rev. D 12/02