



3-5600.090-1 (Rev. E-8/04) English



CAUTION!

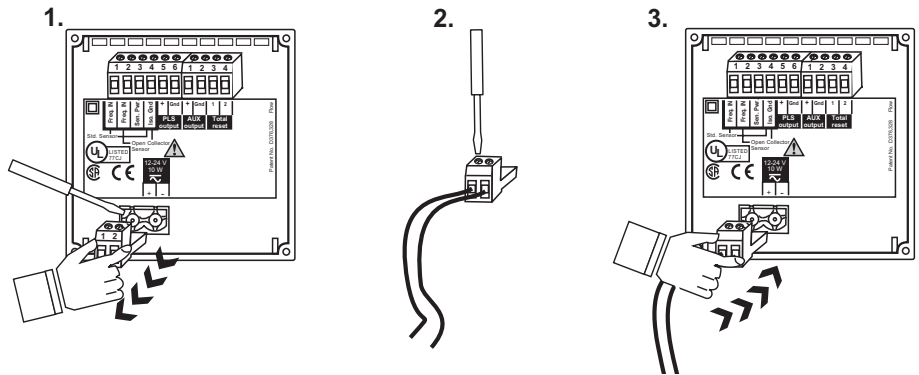
- Remove power to unit before wiring input and output connections.
- Follow instructions carefully to avoid personal injury.

Contents

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| 1. Wiring terminals | 9. 5600 Operation Modes |
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1. Wiring terminals

- Remove terminal blocks for easy wiring.



2. Power Connection

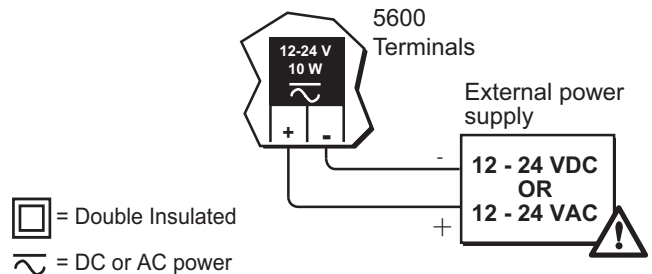


CAUTION!

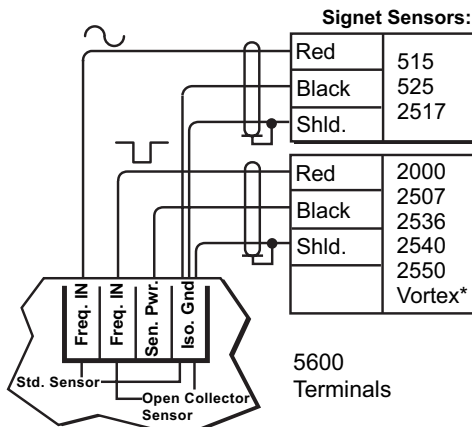
Never connect 115 VAC or 230 VAC to rear power terminals. High voltage AC will damage instrument and void warranty.

Technical Notes:

- Maximum 4-20 mA loop impedance (sec. 8A) is affected by the supply voltage.
- To reduce the possibility of noise interference, isolate AC power lines from signal lines.



3. Compatible Sensor Wiring

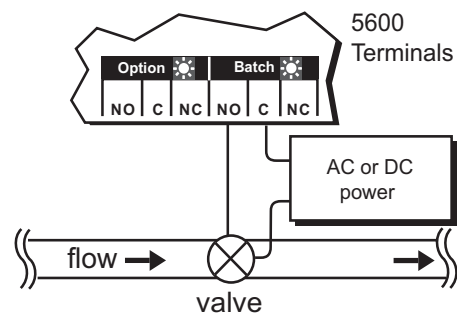


Technical Notes:

- To reduce the possibility of noise interference, route sensor cable away from AC power lines.
- *Vortex sensor or system frequency output

4. Batch Contact Wiring

See section 9 for simple and advanced mode configuration options.



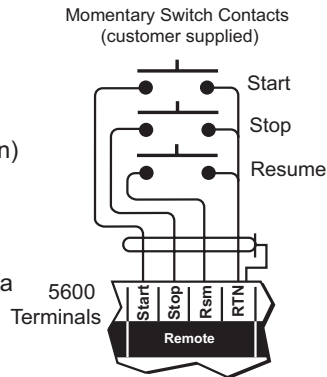
Technical Notes:

- Maximum alarm contact ratings: 5 A @ 30 VDC, 5 A @ 125 VAC, or 3 A @ 250 VAC
- To reduce the possibility of noise interference, isolate AC power lines from signal lines.

5. Remote Control Wiring

Rear START, STOP, and RESUME (Rsm) terminals can provide remote batch control from a distance using one of four methods:

- Mechanical switch closures (shown)
- End of batch pulse from a second 5600 (sec. 6)
- End of batch contact closure from a second 5600 (sec. 7C).
- End of batch current pulse from a second 5600 (sec. 8C).

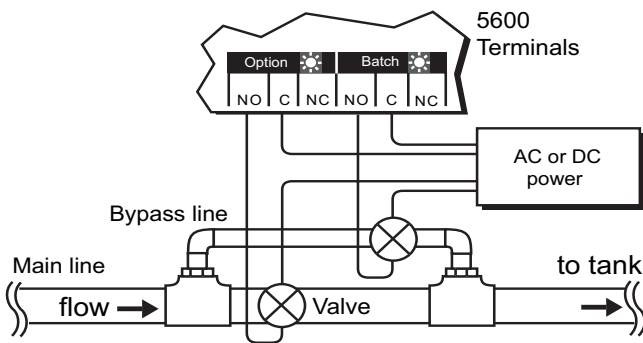


Technical Notes:

- Use 4-conductor **shielded** cable for remote control lines up to 30 m (100 ft) max.

7. Option Contact Wiring Options

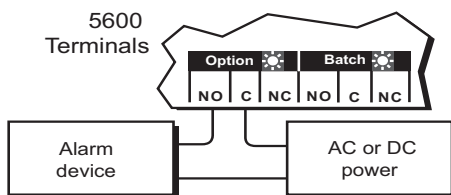
A. Two Stage Shutdown (advanced mode only, sec. 9.2)



Technical Notes:

- Maximum alarm contact ratings: 5 A @ 30 VDC, 5 A @ 125 VAC, or 3 A @ 250 VAC
- To reduce the possibility of noise interference, isolate AC power lines from signal lines.

B. Missing Signal Alarm (simple or advanced mode, sec. 9) OR Overrun Alarm (advanced mode only, sec. 9.2)



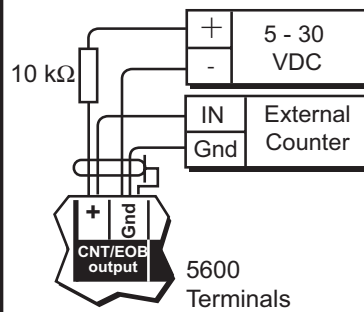
Technical Notes:

- Maximum alarm contact ratings: 5 A @ 30 VDC, 5 A @ 125 VAC, or 3 A @ 250 VAC
- To reduce the possibility of noise interference, isolate AC power lines from signal lines.

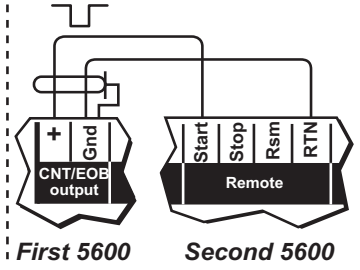
6. End of Batch/Counter Pulse Output Wiring

See section 9 for simple and advanced mode configuration options.

A. External counter connection



B. Daisy chaining two 5600 batch controllers together

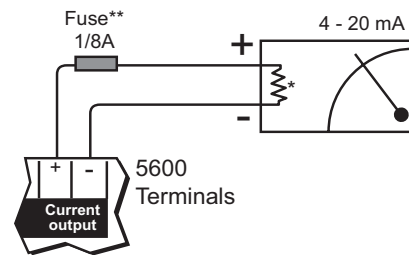


Technical Notes:

- Use 2-conductor **shielded twisted-pair** cable for output lines up to 30 m (100 ft.) max.

8. Current Output Wiring Options

A. Batch Completion (simple or advanced mode, sec. 9)



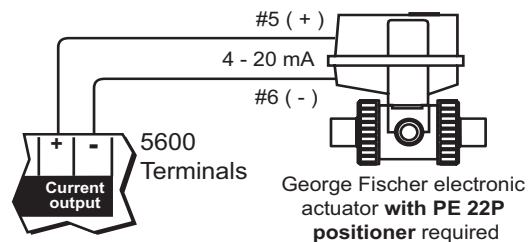
Technical Notes:

- **1/8A fuse recommended (customer supplied)
- * 4-20 mA output is **internally powered** (non-isolated), maximum loop impedance 350 Ω with a 12 V instrument supply voltage, 950 Ω with a 24 V instrument supply voltage.

To isolate output and prevent ground loop problems:

1. Use monitor device with isolated inputs, or
2. Use separate DC supply for 5600 and monitor device, or
3. Power 5600 with 12 - 24 VAC step down transformer

B. Valve Control (advanced mode only, sec. 9.2)



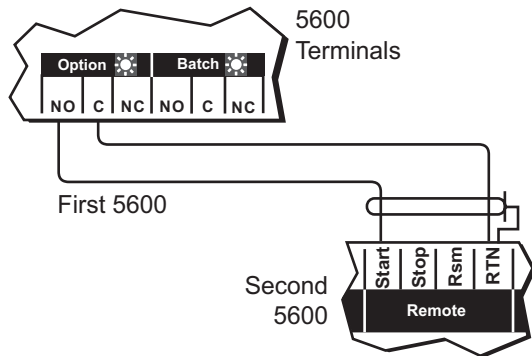
Technical Notes:

- Output compatible with the following George Fischer electronic actuators/PE 22P positioner models: EA 20, EA 30, EA 41 and EA 50

Section 7 Continued...

C. End of Batch Pulse (advanced mode only, sec. 9.2)

Daisy chaining two 5600 batch controllers together for a second batching stage.



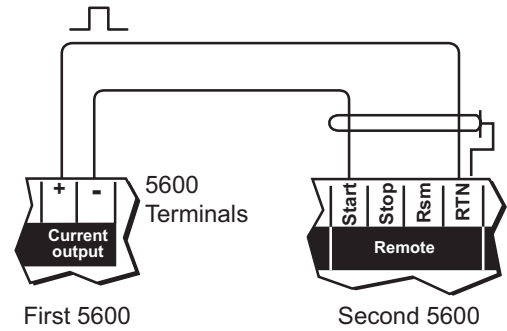
Technical Notes:

- Use 2-conductor **shielded twisted-pair** cable for contact lines up to 30 m (100 ft.) max.

Section 8 Continued...

C. End of Batch Pulse (advanced mode only, sec. 9.2)

Daisy chaining two 5600 batch controllers together for a second batching stage.



Technical Notes:

- Wiring **MUST** be connected exactly as shown.
- Use 2-conductor **shielded twisted-pair** cable for output lines up to 30 m (100 ft.) max.

9. 5600 Operation Modes

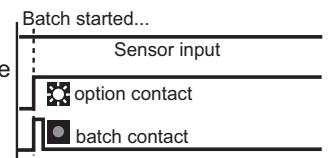
This section gives a detailed description of the 5600's simple and advanced operation modes (sec. 14) and how they affect the batch contact, End of batch/totalizer output, option contact, and current output.

9.1 Simple Operation Mode

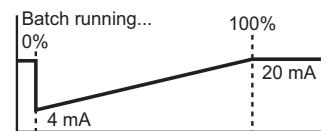
- **Batch Contact (sec. 4):** In simple mode, the batch contact is dedicated for on/off control. It is energized at the start of a batch and de-energized at the end of a batch. It also de-energizes when STOP is selected from the front keypad or initiated by a remote contact closure to the rear STOP terminals (sec. 5). A RESUME command can also be initiated by either method to complete the batch. The front panel batch indicator turns on when the batch contact is energized.

- **Counter/End of Batch Pulse Output (sec. 6):** In simple mode, the output is configured as a counter pulse output. The output emits a 130 millisecond pulse for each engineering (total) unit measured. The output is an open collector type which requires an external pull up resistor and power supply for external counter use (sec. 6).

- **Option Contact - Missing Signal Alarm (sec. 7B):** This function provides alarm capability if flow is not detected in 30 seconds after a batch cycle starts. If the flow sensor signal is missing, the option contact energizes and the front panel contact indicator turns on, signaling the missing sensor signal. The batch contact also de-energizes, closing the flow control valve and stopping the batch. The alarm condition will remain until the front panel ENTER key is pressed or a remote contact closure is made to the rear STOP terminal (sec. 5).



- **Current Output - Batch Completion (sec. 8A):** This function is offered in the simple or advanced operation mode. The output is a linear increase from 4 mA at batch start to 20 mA at batch end.



9.2 Advanced Operation Mode

- **Batch Contact (sec. 4):** The batch contact is dedicated for on/off control and is either manually or automatically

compensated for batch overrun. Manual overrun compensation allows the operator to compensate for valve closure time in a batching system. The operator is prompted to enter a batch volume that de-energizes the batch contact early, compensating for valve closing time and eliminating batch overrun. Automatic overrun compensation counts sensor pulses during the batch cycle, and any excess pulses after the batch stops. The instrument calculates the estimated batch overrun

based on the additional sensor pulses, then automatically reduces the next batch size for the next batch. During the next batch cycle, the batch contact de-energizes early, thus closing the flow control valve early and eliminating batch overrun.

Overrun Comp:
automatic manual

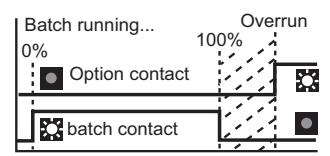
Option Contact:
Two Stage

• **Counter/End of Batch Pulse Output (sec. 6):** In advanced mode, the output can be configured as either a counter pulse output (sec. 9.1) or as an end of batch pulse output. When configured as an end of batch pulse, the output emits a 500 millisecond pulse at the completion of every batch. The output is an open collector type which requires an external pull up resistor and power supply for external counter use (sec. 6).



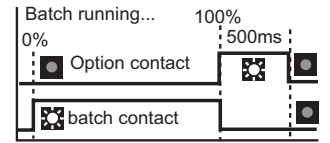
Option Contact:
Overrun Alarm

• **Option Contact - Two Stage Shutdown (sec. 7A):** This function is designed to prevent over filling or to minimize water hammer. Both the batch and the option contact are energized when the batch starts. The option contact then de-energizes at a programmed batch percentage, forcing flow through a smaller bypass line to reduce the fill rate. After the entire batch is measured, the batch contact de-energizes, completing the sequence. Front keypad and remote START, STOP, and RESUME inputs (sec. 5) also control the option contact. The front panel contact indicator turns on when the option contact is energized.



Option Contact:
End of Batch

• **Option Contact - Overrun Alarm (sec. 7B):** This function provides overrun alarm capability for detecting a leaky or stuck valve. If the programmed batch overrun volume is measured after the batch ends, the option contact is energized and the front panel contact indicator turns on, alarming the operator that the flow shut off valve is leaking or stuck open. To cancel alarm, press the ENTER key (or remote STOP switch) once. The overrun alarm will retrigger if the condition persists.



Option Contact:
Missing Signal

• **Option Contact - End of Batch Pulse (sec. 7C):** This function is designed to trigger an external batch counter or second 5600 Batch Controller at the end of a batch. The option contact is energized for 500 milliseconds at the end of every batch cycle. An external power supply switched through the option contact's common (COM) and normally open (NO) terminal provides a pulse for triggering these devices.

Option Contact:
Off

• **Option Contact - Missing Signal Alarm (sec. 7B):** The missing signal alarm represents a missing sensor signal after batch start-up. An adjustable time delay entry (in seconds) is offered which specifies how long the instrument will wait after batch start-up before initiating the missing signal alarm. See simple operation mode (sec. 9.1) for alarm operation details.

Missing Signal Alarm:
On

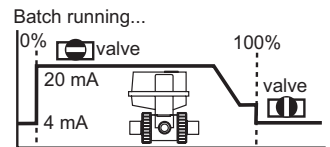
• **Option Contact On/Off (sec. 10.4H):** This function enables or disables the option contact and front panel option LED. When the option contact is configured "Off", the option contact and front panel LED are disabled.

Current Output:
Batch Completion

• **Missing Signal Alarm On/Off (sec. 10.4H):** Missing signal alarm is always enabled (factory default sec. 9.1) even if the option contact is selected to be a different function. This function is designed to completely disable the missing signal alarm, if desired. NOTE: If disabled, the batch contact is NOT affected and will NOT signal the operator or stop the running batch if there is a problem.

Current Output:
Valve Control

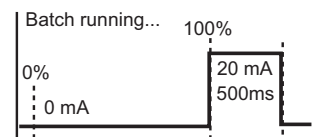
• **Current Output - Batch Completion (sec. 8A):** In advanced mode, the current output functions identical to the simple operation mode. See the simple operation mode explanation above.



Current Output:
End of Batch

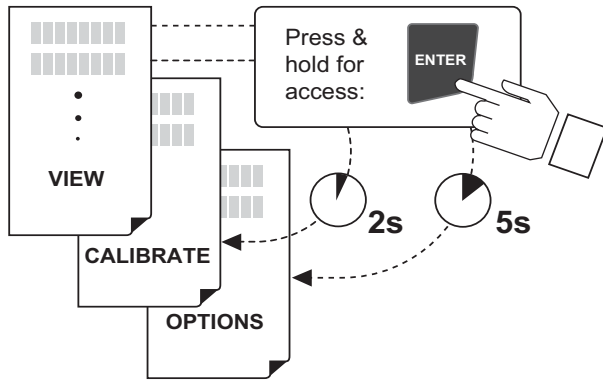
• **Current Output - Valve Control (sec. 8B):** This function is designed for use with a George Fischer electric actuator with PE 22P positioner for preventing overflow or minimizing water hammer. When a batch starts, the current output is held at 20 mA, forcing the PE 22P positioner to the full open valve position.

Near batch end, the output gradually ramps downward to slow the flowrate, then drops to 4 mA closing the valve and ending the batch. Front keypad and remote START, STOP, and RESUME inputs also control the output (sec. 5). A STOP command any time during a batch sequence will force the output to 4 mA and close the PE 22P positioner. (Note: for optimum performance, the batch process should last at least 1 minute!)



10. Menu Functions

*Note: BATCH/VIEW Menu steps B - E **MUST** be selected for CALIBRATE Menu (sec. 10.2) or OPTIONS Menu (sec. 10.4) access.

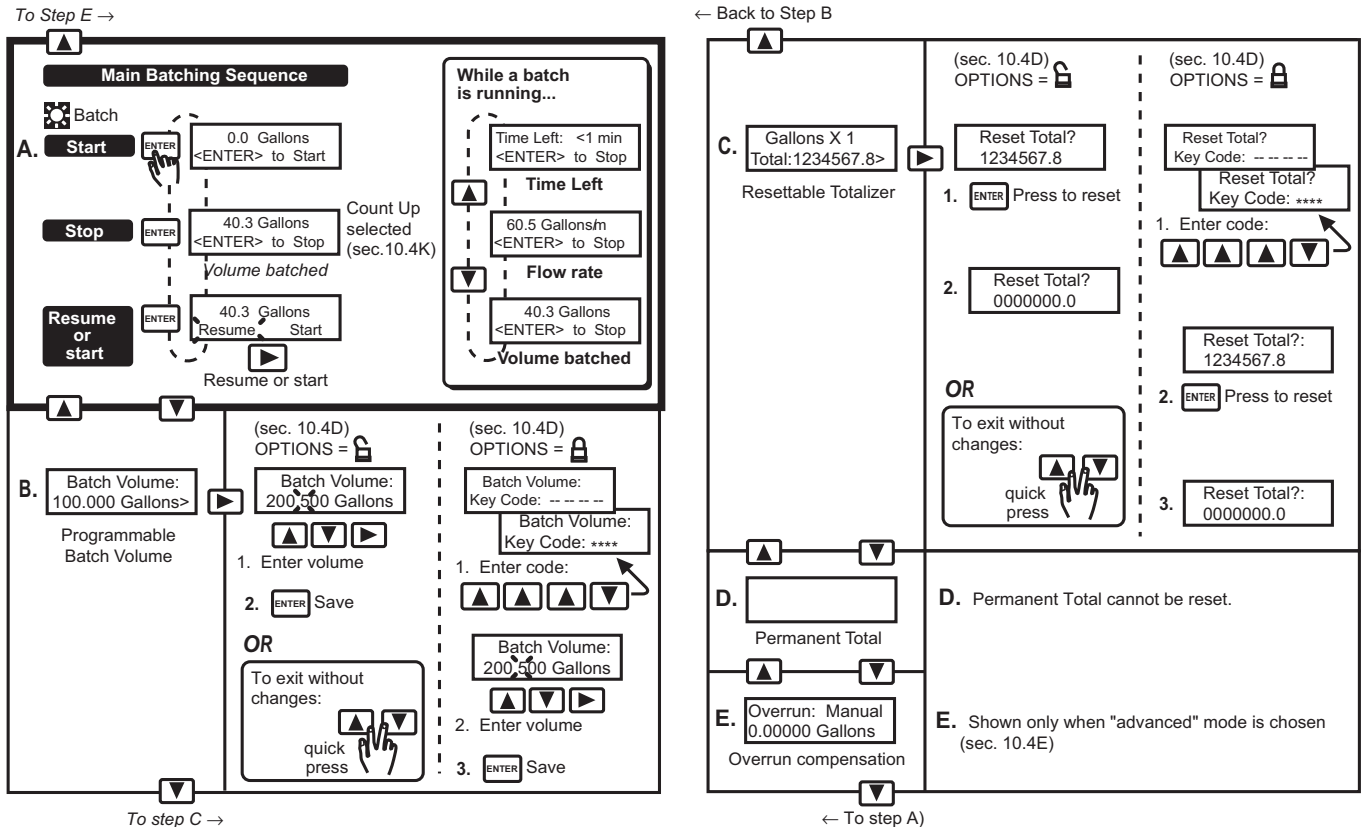


Menus:

- BATCH/VIEW menu (sec. 10.1):** The BATCH/VIEW menu is displayed during standard operation. The ENTER key controls batch start, batch stop, and batch resume operations. While a batch is not running, the operator can navigate freely through the menu by pressing either UP or DOWN arrow keys. While a batch is running, pressing either UP or DOWN arrow keys displays Time left, Flow rate, and Volume batched information. The BATCH/VIEW menu also offers a programmable batch size and resettable totalizer feature that allows the operator to reset the displayed total at the press of a button.
- CALIBRATE Menu (sec. 10.2):** The CALIBRATE menu contains all critical display setup and output parameters. A simple security code feature prevents unauthorized tampering. The operator is required to enter a simple access code for menu access. The same code also unlocks OPTIONS menus.
- OPTIONS Menu (sec. 10.4):** The OPTIONS menu contains setup and display features that are seldom accessed for minor display or output adjustments.

10.1 BATCH/VIEW Menu (example)

- Menu steps B - E cannot be accessed when a batch is running. Press ENTER to stop batch cycle.
- Steps B - E **MUST** be selected for CALIBRATE Menu (sec. 10.2) or OPTIONS Menu (sec. 10.4) access.



10.2 CALIBRATE Menu (factory defaults shown in menu column 1)

CALIBRATE: ----- Press keys in sequence **▲▲▲▼** to continue,
Enter Key Code ***** will appear during code entry.

1 Choose:	2 Change:	3 Save:
A. Batch Units: Gallons > Batch units	Batch Units: Liter Set batch units: Aa - Zz, 0 - 9, /, _ ▲▼▶	
B. Flow Timebase: m > Flow timebase	Flow Time Base: s S m M h H d D Set timebase: S=seconds, M=minutes, H=Hours, D=Days ▲▼▶	
C. Auto Calibrate: Batch K-Factor > Auto Calibrate Procedure <i>Accurate reference container required. See procedure (sec. 10.3)</i>	Auto Calibrate: <input checked="" type="checkbox"/> Batch <ENTER> to Start Auto Calibrate: <ENTER> to Stop Auto Cal Volume: X.XXX Gallons Enter volume Batch K-Factor: 1234.5 A. Reenter volume? B. Accept K-Factor? C. Modify K-Factor? Overrun Volume: X.XXX Gallons D. Overrun comp. Save	"SAVING" briefly displays
★ Display shown only when advanced mode (sec. 10.4E) and manual overrun comp. (sec. 10.4G) is selected.		
To return to VIEW: ▲▼ quick press	To restore original value: ▲▼ quick press	

← Back to step C

D. Batch K-Factor: 60.000 > Batch K-Factor	Batch K-Factor: 3456.7 Set batch K-Factor: 0.0001 - 99999. (see note*) ▲▼▶	
E. Total Units: Gallons x 1 > Totalizer units	Total Units: Liters X100 Set totalizer units: Az - Zz, 0 - 9, /, _ (Label use only) ▲▼▶	
F. Total K-Factor: 60.000 > Totalizer K-Factor	Total K-Factor: 3456.7 Set totalizer K-Factor: 0.0001 - 99999. (see note*) ▲▼▶	"SAVING" briefly displays
G. Last CAL: 01-01-98 Last calibration	Last CAL: 01-01-98 Last CAL: Sets user defined date ▲▼▶	
To return to VIEW: ▲▼ quick press	To restore original value: ▲▼ quick press	

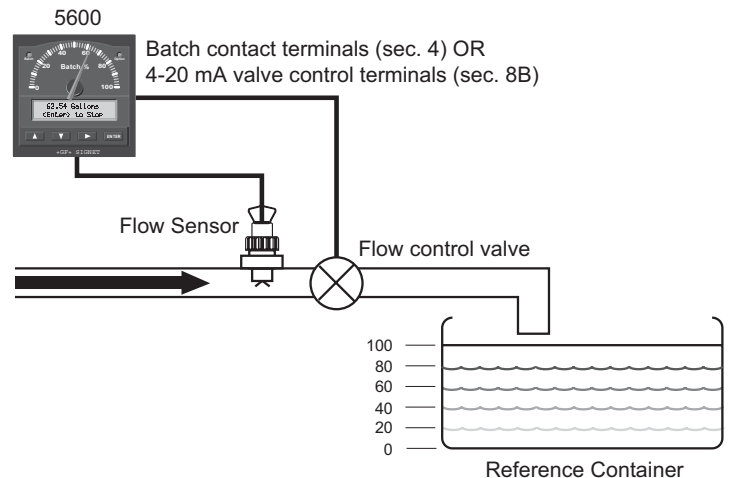
*Note: Batch and totalizer K-Factor settings represent the number of pulses generated by the *GF* SIGNET flow sensor for each engineering unit of fluid measured (published in the flow sensor manual).

10.3 Auto Calibration Procedure

The auto calibrate procedure (sec. 10.2C) calculates a custom flow sensor/batch K-Factor based on volumetric measurement for more precise batching. This process will compensate for installation abnormalities or nonstandard pipe sizes for maximum batch accuracy. An accurate measurement reference container (e.g. known tank volume) is required for this procedure. If auto calibration is impractical for your batch system, perform manual calibration using the K-Factors published in your flow sensor manual.

Requirements:

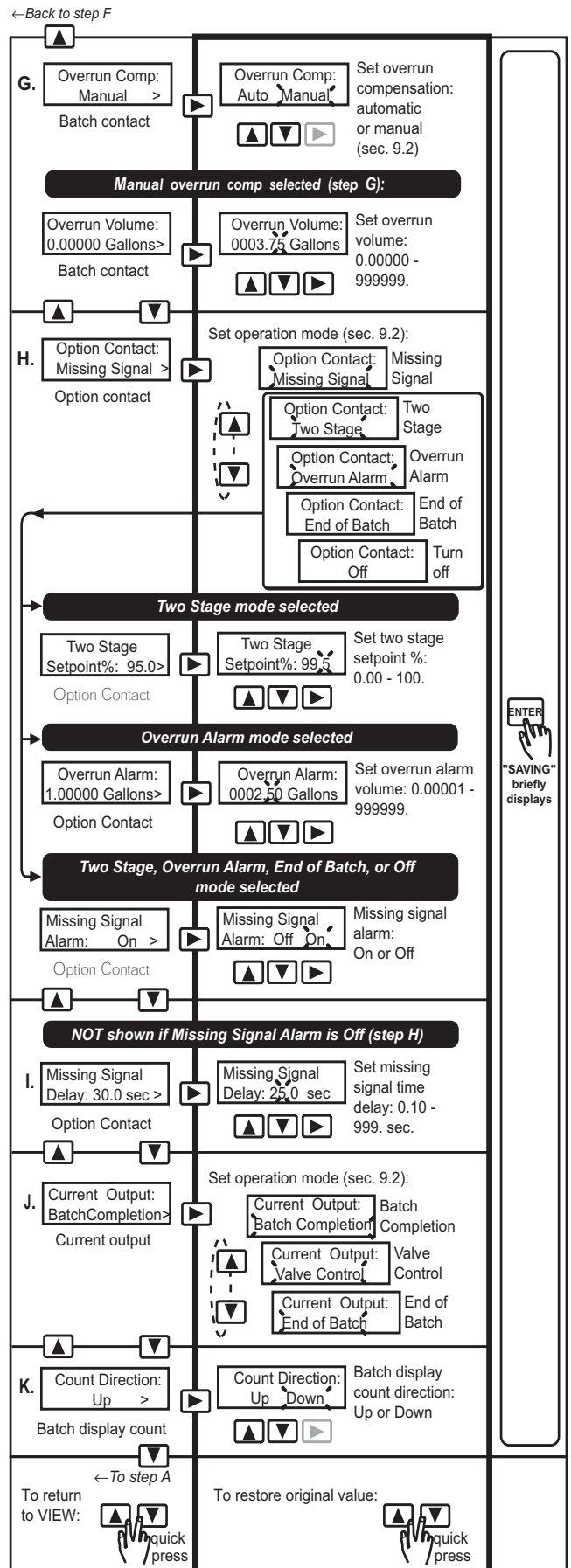
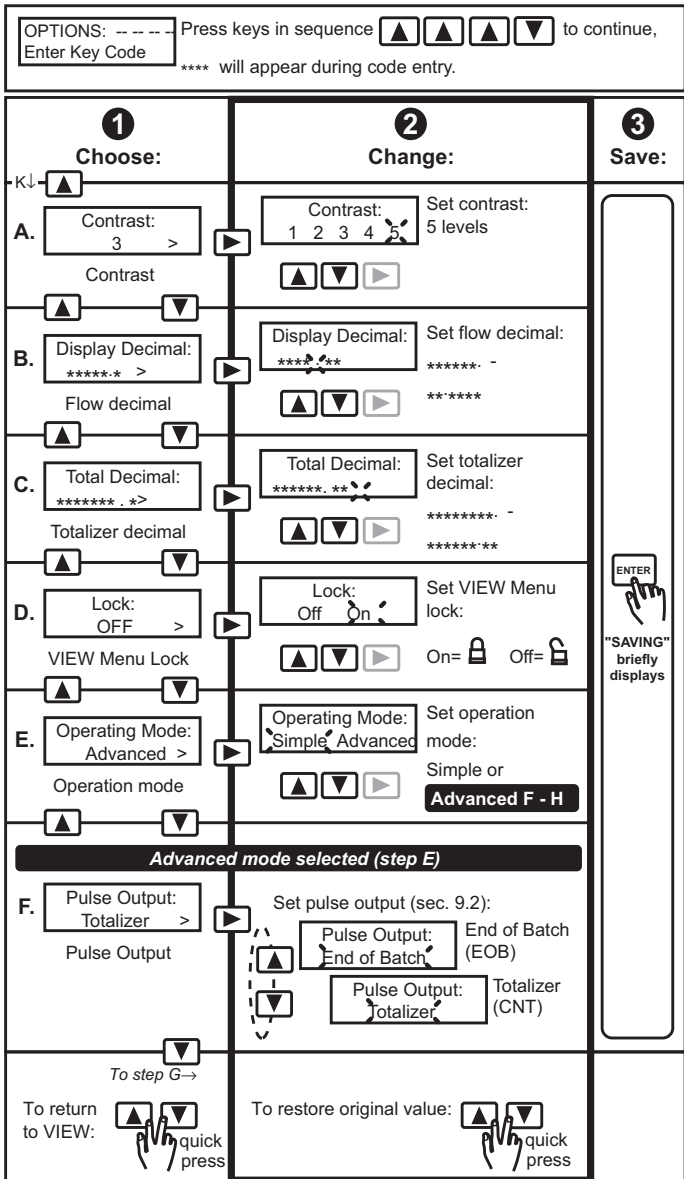
- The flow sensor must be installed in the actual batch pipeline.
- The flow control valve can be connected to the common (C) and normally open (NO) batch contact terminals (sec. 4) or the current output terminals (sec. 8B).
- Either the batch contact or current output **MUST** be used to energize and de-energize the main flow control valve which starts and stops fluid flow into the known reference container.
- Follow the steps outlined in the auto calibration procedure (sec. 10.2C) to obtain your batch system's custom K-Factor.



WARNING!

The auto calibration procedure generates a custom batch K-Factor. The batch and Totalizer K-Factors are independent from one another. ALWAYS reenter your totalizer K-Factor after performing the auto calibration procedure.

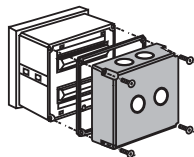
10.4 OPTIONS Menu (factory defaults shown in menu column 1)



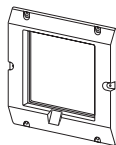
Menu Navigation

- Advanced mode chosen (step E): menu continues, steps F - I.
- Simple mode chosen (step E): down arrow key advances to top of menu (step A).

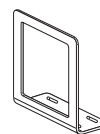
11. Parts and Accessories



Splashproof rear cover
#3-5000.395
(code 198 840 227)



5 x 5 inch adapter plate
for Signet retrofit
#3-5000.399
(code 198 840 224)



Optional surface mount
bracket #3-5000.598
(code 198 840 225)

- Power supply, 115 VAC - 24 VAC, #3-5000.075 (code 159 000 321)
- Front snap-on bezel, #3-5000.525-4 (code 159 001 221)
- 5600 instruction sheet #3-5600.090-1 (code 198 869 929)

12. Specifications

General

Sensor compatibility: All Signet flow sensors
Accuracy: $\pm 0.5\%$ of batch reading
Input: Optically isolated

Enclosure:

- Rating: NEMA 4X/IP65 front
- Dimensions: 1/4 DIN, 96 x 96 x 88 mm (3.8 x 3.8 x 3.5 in.)
- Case materials: ABS plastic
- Keypad material: Sealed 4-key silicone rubber
- Weight: Approximately 500 g (18 oz.)

Display:

- Type: Microprocessor controlled air-core meter movement and alphanumeric 2 x 16 LCD
- Update rate: <200 ms
- Contrast: User selected
- Alarm annunciators: green batch LED (left), red option LED (right)

Totalizers:

- 8-digit resettable with security option
- 8-digit non-resettable

Environmental

Operating temp.: -10 to 55 °C (14 to 131 °F), 50 °C (122 °F)
max. with optional rear cover
Storage temp.: -15 to 80 °C (5 to 176 °F)
Relative humidity: 0 to 95%, non-condensing
Altitude: 4000 m max.
Pollution degree: 2

Agency Approvals

- CE, CSA, UL listed
- Manufactured under ISO 9001 and ISO 14001

Electrical

Power:

- 12 to 24 VDC or 12 to 24 VAC, unregulated, 50-60 Hz, 10 W max.

Contacts (2 sets):

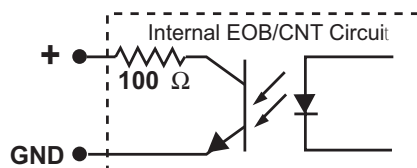
- Mechanical SPDT contacts
- Maximum voltage rating: 5 A @ 30 VDC, 5 A @ 125 VAC, or 3 A @ 250 VAC, (power factor = 1.0)

Current output:

- 4 to 20 mA, non-isolated, internally powered
- Update rate: <200 ms
- Max loop impedance: 350 Ω max with a 12 V instrument supply voltage, 950 Ω max with a 24 V instrument supply voltage
- Accuracy: $\pm 0.1\%$ of max range

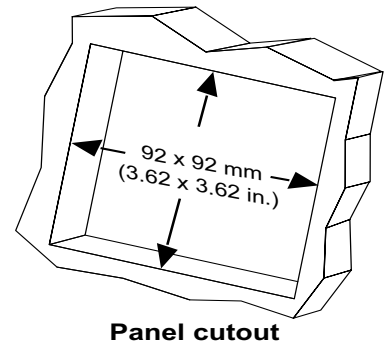
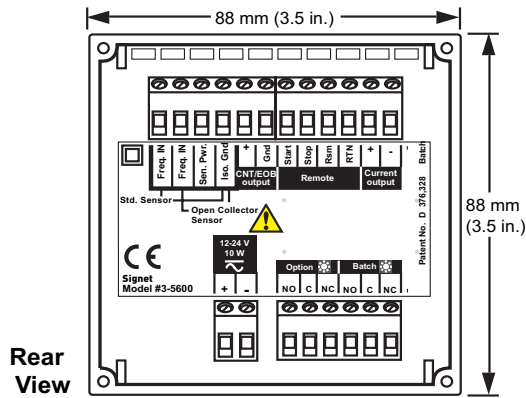
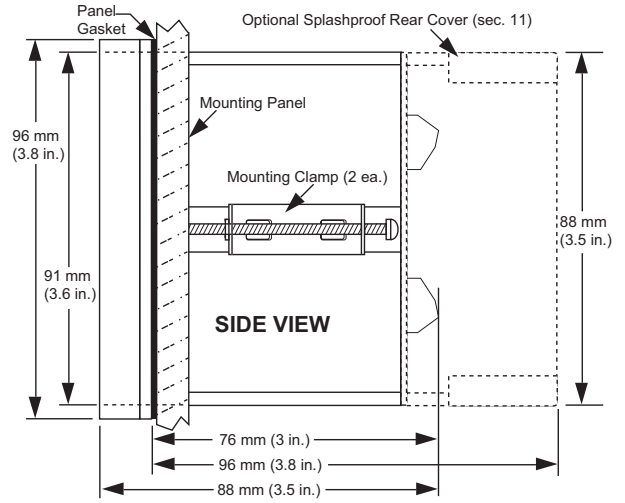
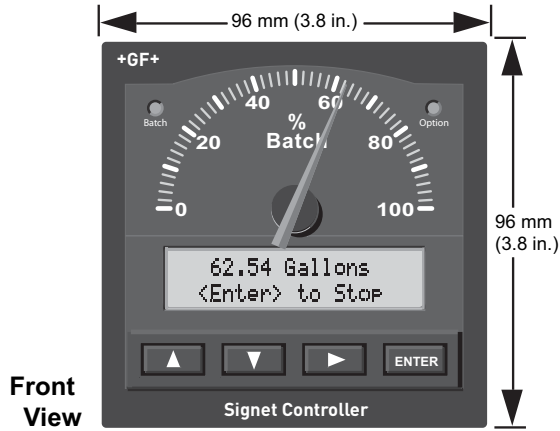
Totalizer (CNT)/End of batch (EOB) pulse outputs:

- Open-collector transistor, optically isolated, 5 mA max. sink, 28 VDC max. pull-up voltage, 130 ms (CNT) pulse width
- End of batch pulse output 500 ms (fixed)



Noise immunity: EN50082-2
Noise emissions: EN55011
Safety: EN61010-1

Dimensions:



13. Quick Reference Menu Parameters

13.1 VIEW Menu Setup Parameters (sec. 10.1)

Menu Parameters	Display Description	Range	Factory Default
A. 100.0 Gallons <ENTER> to Start	Press ENTER to start, stop, or resume batch	See programmed batch volume B	100.000 Gallons
B. Batch Volume: 100.000 Gallons>	Programmed batch volume	0.00001 - 9999999.	100.000 Gallons
C. Gallons X 1 Total:1234567.8>	Resettable totalizer	000000.00 - 99999999.	0000000.0
D. Gallons X 1 °Total:1234567.8	Permanent totalizer	000000.00 - 99999999.	0000000.0
E. Overrun: Manual 0.00000 Gallons	<ul style="list-style-type: none"> • Overrun mode • Overrun volume 	Manual or Auto 0.00000 - 999999.	00000.0

13.2 CALIBRATE Menu Setup Parameters (sec. 10.2)

Menu Parameters	Display Description	Range	Factory Default
A. <input type="text" value="Batch Units: Gallons >"/>	Batch units	Aa - Zz, 0 - 9, /, _ (8-digits max.)	_Gallons
B. <input type="text" value="Flow Timebase: m >"/>	Flow timebase	Ss, Mm, Hh, Dd	m (m= minutes)
C. <input type="text" value="Auto Calibrate: Batch K-Factor >"/>	Optional volumetric calibration	n/a	n/a
D. <input type="text" value="Batch K-Factor: 60.000 >"/>	Batch K-Factor	0.0001 - 99999.	60.000
E. <input type="text" value="Total Units: Gallons x 1 >"/>	Total units	Az - Zz, 0 - 9, /, _ (15-digits max.)	Gallons X 1
F. <input type="text" value="Total K-Factor: 60.000 >"/>	Total K-Factor	0.0001 - 99999.	60.000
G. <input type="text" value="Last CAL: 01-01-98"/>	Last Calibration date	00 - 00 - 00 to 39 - 39 - 99	01 - 01 - 98

_ = blank display digit option

_ = blank display digit option

13.3 OPTIONS Menu Setup Parameters (sec. 10.4)

Menu Parameters	Display Description	Range	Factory Default
A. <input type="text" value="Contrast: 3 >"/>	Display contrast	0 to 5	3
B. <input type="text" value="Display Decimal: ***** >"/>	Flow decimal	**.* to ****.*	***.*
C. <input type="text" value="Total Decimal: *****.* >"/>	Total decimal	*****.* to *****.*	*****.*
D. <input type="text" value="Lock: OFF >"/>	VIEW menu total/batch volume reset access code	On or Off	Off
E. <input type="text" value="Operating Mode: Advanced >"/>	Simple or Advanced	n/a	Advanced
F. <input type="text" value="Pulse Output: Totalizer >"/>	Pulse output operation mode	End of Batch or Totalizer	Totalizer
G. <input type="text" value="Overrun Comp: Manual >"/>	Overrun compensation mode	Manual or Auto	Manual
<input type="text" value="Overrun Volume: 0.00000 Gallons >"/>	Overrun volume	0.00000 - 999999.	0.00000 Gallons
H. <input type="text" value="Option Contact: Missing Signal >"/>	Option contact mode	Missing signal, Two stage, Overrun alarm, End of Batch, Off	Missing signal
<input type="text" value="Two Stage Setpoint%: 95.0 >"/>	Option contact, two stage mode	0.00 % - 100. %	95.0%
<input type="text" value="Overrun Alarm: 1.00000 Gallons >"/>	Option contact, overrun alarm mode	0.00001 - 999999.	1.00000 Gallons
<input type="text" value="Missing Signal Alarm: On >"/>	Missing signal alarm	On or Off	On
I. <input type="text" value="Missing Signal Delay: 30.0 sec >"/>	Missing signal alarm delay	0.10 - 999 seconds	0.10 seconds
J. <input type="text" value="Current Output: BatchCompletion >"/>	Current output mode	Batch Completion, Valve control, or End of Batch	Batch Completion
K. <input type="text" value="Count Direction: Down >"/>	Batch count direction	Count up or down	Count up

14. Maintenance

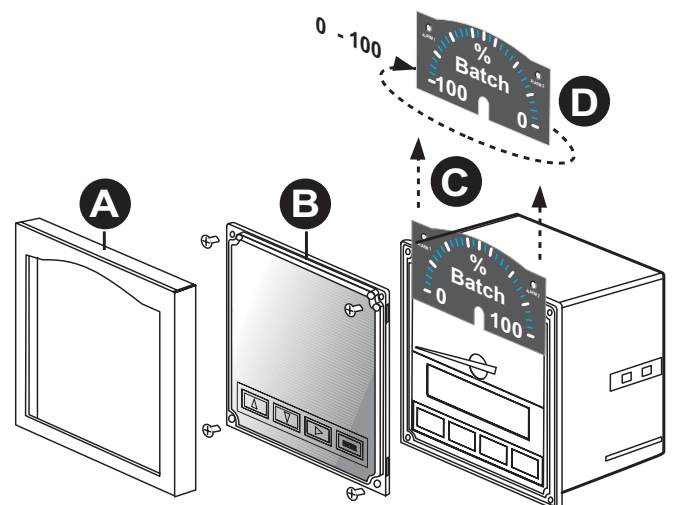
Clean the instrument case and front panel with a soft cloth and mild liquid soap solution.

15. Troubleshooting

Display	Problem	Solution
--- --Gallons/m <ENTER> to START	Display timebase too large	Change flow timebase (S=Seconds, M=Minutes, H=Hours, D=Days) in CALIBRATE menu to a smaller value (e.g. GPD to GPM)
Time Left - - - min <ENTER> to Stop	Remaining batch time greater than 999 minutes (overrange)	Display will show actual remaining minutes after the remaining batch time is less than 999 minutes
-0001.8 Gallons <ENTER> to Start	Flow rate detected after batch end	Repair leaky or stuck flow shutoff valve.
Flow K-Factor cannot be zero	Flow (batch) display K-Factor cannot be zero	Enter K-Factor greater than zero (sec. 10.2D)
Total K-Factor cannot be zero	Totalizer K-Factor cannot be zero	Enter K-Factor greater than zero (sec. 9.2E)
Must be between 0.10 - 999	Missing signal time delay must be set for 0.10 - 999 seconds	Enter missing signal time delay within 0.10 - 999 seconds (sec. 10.4I)
Overrun Volume cannot be zero	Overrun alarm volumetric setting must be within 0.00100 - 999999. engineering units	Enter overrun alarm volumetric setpoint within 0.00100 - 999999. engineering units (sec. 10.4H)
Power Failure Resume Clear	Instrument power interrupted during active batch process	Use RIGHT arrow key to select "Resume" or "Clear". Selecting resume will continue the batch from the point where the power interruption occurred. Selecting clear will clear the power failure. After your selection has been made, press ENTER to continue.
Setup Read Error Press any Key	Power fault occurred while saving setup menu entry	Press any key to reload factory defaults then reprogram flow system setup parameters. Note: Totalizer displays remain undisturbed and will resume after instrument reset.

Dial Selection

- The analog display shows percentage of batch complete.
- The reversible dial scales are 0 to 100%, or 100 to 0%.
- The instrument is shipped with the 0 to 100% scale installed.
- Reverse the face plate for either scale.
- Meter deflection is fixed from left to right.



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