The Signet 9900-1BC Batch Controller is compatible with the Signet models 515 (8510), 525, 2536 (8512), 2537 and 2540 paddlewheel flow sensors, models 2551 and 2552 insertion magmeters, and models 2000, 2507, and 2100 in-line flow sensors.

Description

Your new 9900-1BC Batch Controller system includes the following items:
- Signet 9900 Transmitter (3-9900-1P)
- Signet Relay Module (3-9900.393)
- Signet Batch Module (3-9900.397)

Note:
Batch Module requires Generation II, or later, 9900 transmitter. Verify 9900 Transmitter generation under the OPTIONS Menu.

Safety Information

- Follow instructions carefully to avoid personal injury.
- This unit is designed to be connected to equipment which can be hazardous to persons and property if used incorrectly.
- Read and understand all associated equipment manuals and safety warnings before using with this product.
- Remove power to unit before wiring connections.
- Wiring connections to this product should only be performed by qualified personnel.
- Do not use unit if front panel is cracked or broken.

<table>
<thead>
<tr>
<th>Warning / Caution / Danger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, injury, or death.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrostatic Discharge (ESD) / Electrocution Danger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerts user to risk of potential damage to product by ESD, and/or risk of potential of injury or death via electrocution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTE / Technical Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlights additional information or detailed procedure.</td>
</tr>
</tbody>
</table>
Warranty Information

Refer to your local Georg Fischer Sales office for the most current warranty statement.
All warranty and non-warranty repairs being returned must include a fully completed Service Form and goods must be returned to your local GF Sales office or distributor.
Product returned without a Service Form may not be warranty replaced or repaired.
Signet products with limited shelf-life (e.g. pH, ORP, chlorine electrodes, calibration solutions; e.g. pH buffers, turbidity standards or other solutions) are warranted out of box but not warranted against any damage, due to process or application failures (e.g. high temperature, chemical poisoning, dry-out) or mishandling (e.g. broken glass, damaged membrane, freezing and/or extreme temperatures).

Product Registration

Thank you for purchasing the Signet line of Georg Fischer measurement products.
If you would like to register your product(s), you can now register online in one of the following ways:
• Visit our website www.gfsignet.com.
  Under Service and Support click Product Registration Form
• If this is a pdf manual (digital copy), click here

CAUTION:
Avoid Electrostatic Discharge (ESD)

• Minimize handling of plug-in modules to reduce the possibility of damage due to ESD.
• Handle modules by the edges.
  Never touch any exposed circuitry or contacts.
• Wear an anti-static wristband or stand on an anti-static mat, or keep one hand touching a properly grounded pipe or other properly grounded piece of metal when handling modules.

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**Panel Mount Installation**

**Tools and Equipment Required**
- Fine-tooth file
- ¼ DIN punch or jigsaw suitable for cutting panel opening to within 1 mm (0.04 in) tolerance.
- ¼ DIN punches are available and recommended for creating clean, precise openings quickly and easily in most instrument panels.
- If a punch is not available, a jigsaw or other cutting tool can be used. An adhesive template is provided to help guide the cutting process.
- De-burr and smooth the opening with a file.

**Recommended clearance on all sides between instruments is 25 mm (1 in).**
1. Place gasket on instrument, and install through ¼ DIN size opening.
2. Slide mounting bracket over back of instrument until bracket snaps into latches on sides of instrument.

To remove:
1. Secure instrument temporarily with tape from front or grip from rear of instrument. **DO NOT RELEASE.**
2. Press bracket clips outward and remove.

**Field Mounting (Accessory Required)**
The Panel Mount unit can be installed in the optional Wall Mount Accessory (3-9900.392, 159 001 700), for field mount installation.

---

**System Start-up: Step 1**
*Prepare the Controller installation location. If the back of the Controller is difficult to access when installed, wire the removable terminal plugs first, then attach to 9900 Transmitter.*

*Next step: Wiring (Step 2).*
Module

Batch Module
Convert a 9900 Transmitter (Generation II or later) to a Batch Controller by plugging in a Batch Module (3-9900.397).

Optional Module Wiring:
- Wire an external button or keypad (customer supplied) to stop, start or resume a batch remotely.
- Wire an external input that can inhibit a batch from starting.

To remove modules:
1) Remove power from the 9900
2) Remove the Relay module
3) Loosen bottom screw of Batch module
4) Carefully grip and squeeze the tabs at the top of the module to release
5) Pull module away from the unit
6) Do not bend the connecting pins

Relay Module
In addition to the Open Collector output in the 9900 base unit, the 9900-1BC has a Relay Module which adds two programmable dry-contact relays. The Open Collector output in the base unit uses the Relay 1 setting in the menus. The Relay Module is assigned to relays 2 and 3 in the menus.

Dry-contact relays are electromechanical switches with a moving contact armature. They are suitable for many general-purpose applications, AC or DC, including AC loads up to 250 V. Install RC Filter Kits, 3-8050.396, on relays used to switch motor or inductive loads.
- Two SPDT dry-contact relay inputs
- User programmable
- 250 V, 5 A maximum resistive loading (AC).
- Can switch line voltage (typically 120 to 240 VAC)
- Can switch DC voltage (< 30 VDC @ 5A)
- Larger voltage and current ratings than Open Collector outputs (30 VDC, 50 mA maximum)

⚠️ CAUTION: ⚠️
Switching active loads (usually inductive) can cause contact arcing sufficient to damage the relays. The RC Filter Kit or “snubber” (part number 3-8050.396) is available as an accessory to reduce or eliminate these damaging effects. Recommended for inductive loads greater than 50 VAC (remote relays, solenoids, pumps, etc.).
Terminal Identification

Terminals 1-2: DC Power
- Required by the instrument
- Provides power to sensors, relays and the LCD backlight

Terminals 3-4: 4 to 20 mA
- Passive 4 to 20 mA output

Terminals 5-6: Open Collector
- Software selectable for Normally Open or Normally Closed

Terminals 7-10: Digital (S³L)/Frequency Input
- For sensor wiring
- PC COMM wiring

The 9900-1BC requires regulated 10.8 to 35.2 VDC (24 VDC nominal) from an external power supply. Maximum current draw is 300 mA.

Digital (S³L) / Frequency
Connect sensor wire plug here as shown on page 7.

Power
Connect power and open collector wire plug here as shown on pages 8 and 9.
System Start-up: Step 2

Wire the transmitter connections with the power off. Keep any 4 to 20 mA and relay-actuated output devices that are connected to it offline at this time. Wire the sensor (pg. 7), power (pg. 8) and Open Collector and relay(s) (pg. 9).

Next step: System Setup (Step 3).

Wiring Tips:
- Do not route the sensor or DC power cables in conduit containing AC power wiring. Electrical noise may interfere with sensor signal.
- Routing the sensor cable in grounded metal conduit can help prevent electrical noise and mechanical damage.
- Seal the cable entry points to prevent moisture damage.
- Only one wire should be inserted into a terminal.
- Splice double wires outside the terminal or use appropriate wire ferrule, not to exceed 2 mm (0.08 in) diameter.

**CAUTION:**

DO NOT bundle Relay Module wiring with other wiring.
Doing so may cause injury and/or damage to 9900 Transmitter, Relay Module, and Batch Module.

All wiring connections to the 9900-1BC are made via removable terminal plugs.

In general:
- Terminals accept 12 to 24 AWG wire.
- Strip 7 mm (0.28 in.) of insulation from wire tips and tin bare ends to eliminate fraying.
- Insert wire tip or ferrule completely into the terminal and secure with the screw.
- Do not allow any AC leads that may be connected to the internal relays to come in contact with low voltage wiring.

**CAUTION:**

Avoid Electrostatic Discharge (ESD)
- Minimize handling of plug-in modules to reduce the possibility of damage due to ESD.
- Handle modules by the edges. Never touch any exposed circuitry or contacts.
- Wear an anti-static wristband or stand on an anti-static mat, or keep one hand touching a properly grounded pipe or other properly grounded piece of metal when handling modules.

Tools Required
- Phillips screwdriver
- Flat-head screwdriver
- Wire strippers
2551 Technical Notes:
- When the blue jumper illustrated is placed over both pins, the 2551-XX-11 (Blind Magmeter) outputs an open collector frequency signal. When the jumper is removed (or placed over one pin for storage) the 2551-XX-11 outputs a Digital (S3L) signal.

2551 & 2552 Technical Notes:
- Either Frequency or Digital (S3L) may be used.
- The frequency output will be displayed as positive flow regardless of the flow direction.
- Signet recommends configuring the 2551 with the Digital (S3L) output because it is more accurate.
- Input sensor type is selected by choosing between “SENSOR FREQ” and “SENSOR S3L” in the INPUT menu.
- 5 VDC power is provided to the 2551 Magmeter by the 9900-1BC. No additional power is required.
CAUTION!
DO NOT connect your 9900 to AC power.
The 9900 MUST be powered by 10.8-35.2 VDC ONLY.

**Stand-alone application**

![Diagram of 9900 terminals with power supply connections](image)

**Connection to a 4 to 20 mA device**

![Diagram of 9900 terminals with 4 to 20 mA device connections](image)

**Batch Module Wiring**

Connect an external button or keypad (not supplied) to remotely control the 9900-1BC by wiring the Batch Module as shown.

*Wire an external input as override for preventing batch from starting.*
Open Collector Wiring

- Longer life than a mechanical relay
- No moving parts
- Faster ON/OFF switching capabilities than mechanical relays
- Can switch DC voltage only (< 30 VDC, < 50 mA)
- Not recommended for use with inductive loads

Fail-Safe Behavior
No matter the setting, the Open Collector output turns off if the 9900 loses power. This must be taken into account when evaluating system failure consequences. If the system layout requires a “closed” or “on” condition for the output in case of power loss, a mechanical dry-contact relay (NC contacts) must be used instead of the Open Collector (R1) output.

The 9900 Open Collector (R1) output provides high-speed switching capability. Signal frequencies can reach 400 pulses per minute.
The 9900 Open Collector (R1) output connection is dependent upon the type of circuit being controlled by the output. Most indicating instruments or control system inputs require a signal voltage of 0 to 5 V (TTL or CMOS logic levels) or 0 to 24 V. Therefore, the 9900 Open Collector output circuits must be equipped with a pull-up or pull-down resistor (not supplied), and a quality regulated 5 to 24 V (depending on the application) power supply (not supplied) is recommended to function properly.

NPN Style Wiring

If an external device needs logic 0 (logic LOW) input when the Open Collector is de-energized in an NPN configuration, set R1 NORMAL to CLOSED in the RELAY menu.

PNP Style Wiring

with NORMAL set to OPEN.
Relay Module Wiring

The alarm is OFF during normal operation, and will go ON when relay energizes according to 9900 Relay settings.

The valve is OFF during normal operation, and will go ON when relay energizes according to 9900 Relay settings.

- **NO** = normally open (closes when energized)
- **NC** = normally closed (opens when energized)

---

Relay Mode Settings

**BATCH – Batch**: 
Activates relay while batch is running.

**VOL PULS – Volumetric Pulse**: 
Generates a pulse each time a user defined volume is reached.

**MISSING – Missing Signal**: 
Activates relay when no flow is detected in X seconds after a batch cycle starts. (X is user defined) Default = 5 seconds.

---

*Simple Mode*  
(See Input Menu - Page 18)

![Diagram of relay module wiring and settings](image-url)

- **Relay energized**
- **Relay de-energized**

---

% Batch Percentage  
Time

- **Flow Input**  
Time

- **AC or DC power**  
Valve

- **AC or DC power**  
Relay Module Wiring

![Diagram of relay module wiring and settings](image-url)

- **NO**  
**NC**  
**C**

- **RELAY 2**
- **RELAY 3**
**Relay Mode Settings**

**HI FLOW – High Flow:**
In HI FLOW Mode, Relay is energized at Set Flow value and will be de-energized at Set Flow value minus Hysteresis value.

If STOP BATCH is set to YES, the hysteresis is ignored. A batch stopped for a high flow condition will not automatically resume when the flow decreases below the hysteresis level. User interaction is required to resume the batch.

**EOB PULS – End of Batch Pulse:**
Generates a pulse at the end of a batch which can be used for external counter or to start a second batch controller.

**OVERRUN – Overrun:**
Activates relay when Overrun reaches the specified volume (see Set Overrun Volume, page 20).

**Note:** The Overrun Alarm Volume must be greater than the Manual Compensation Volume. If the Overrun Alarm Volume is less than or equal to the Manual Compensation Volume, the Overrun Alarm will activate on every batch.

**SRC VOL – Source Volume:**
Activates relay when Source Volume falls to specified volume (*only available when “Source Volume” is ON*)
**TOT VOL – Totalizer Volume:**
When resettable totalizer exceeds specified volume, relay activates and latches.
Requires Totalizer Volume Reset to deactivate relay (see Reset Total, page 17).
This mode is useful to trigger a reminder when a process is due, as for a backwash cycle or filter change.

**TWO STG – Two Stage:**
This function is designed to prevent overfilling or to minimize water hammer. Both the mainline relay and the bypass relay are energized when the batch starts. The mainline relay then de-energizes at a programmed batch percentage, allowing flow to continue through a smaller bypass line to reduce the fill rate (see diagram). After the batch is dispensed, the bypass relay de-energizes, completing the sequence.

**NOTE:** If Relay 1 is selected for Two-Stage operation, relay 2 defaults to Bypass. If Relay 2 is selected, relay 3 defaults to bypass. If Relay 3 is selected, relay 2 defaults to bypass.

**MULTIPLE – Multiple Mode:**
Activates relay when any one of the four enabled conditions are met. User can select from Missing Signal, Overrun, High Flow or Error.

**ERROR – Error:**
If using S³L flow sensor, activates relay when no sensor is detected.

---

Advanced Mode
(See Input Menu - Page 18)
**Operation**

- **Open Collector (R1) Indicator LED**
- **Mechanical Relay (R2) Indicator LED**
- **Backlight Sensor (do not block)**
- **Mechanical Relay (R3) Indicator LED**
- **Warning LED**
- **Bar Graph**
- **Units of Measure (GPM, sec, %, etc.)**
- **Value**
- **Label**
- **Menu Indication**
- **Menu Navigation Keys**

**UP, DOWN keys**
Scroll through Menu options or adjust values during editing. Press both together to exit a menu or escape without saving.

**RIGHT key**
Select item or character to edit.

**ENTER key**
Access menus
Save changes.

**DOWN and RIGHT keys**
Press both together to enable manual batch or top off a previous batch. The valve will open as long as the keys remained pressed.
System Setup: Menu Navigation

This basic operating procedure repeats throughout the 9900 program:
1. Press ENTER for 3 seconds to enter EDIT menu.
2. Press ► to move to a specific menu item.
3. Press ENTER key to select the item for editing.
4. Press ▲ or ▼ to edit the value/selection.
5. Press ENTER to store the new value/selection.
6. Press ▲+▼ to select another menu item. Repeat steps 3-5 as required.
7. Press ▲+▼ again to return to normal operation.

NOTE: The 9900 displays the BATCH instrument type ONLY if the Remote Batch Module is installed.

The menu is constructed in a loop, so you can move forward and backward to select an item. After any item is edited, the display will return to the selected item.

NOTE: Example only. Your display may be different.
**VIEW Mode Overview**

The top level of menus is referred to as the VIEW Mode. This view displays measurement values as well as current outputs and relay status. The radial bar graph represents the measurement value that is also displayed in the 7-segment numeric field below the bar graph. The bar graph is primarily used to display the full scale range of the sensor, but can be scaled via a menu item.

During normal operation, the 9900 displays the VIEW mode.
- To select a display, press the ▲ or ▼ arrow keys. The display selections scroll in a continuous loop.
- Changing the display selection does not interrupt system operations.
- No password is necessary to change display selection.
- Output settings cannot be edited from the View Mode.
- The display will return to the VIEW mode if no button is pressed for 10 minutes.

**MENU Mode Overview**

The MENU mode enables the user to view and configure all menu items. The five menus available are: CAL, INPUT, LOOP, RELAY, and OPTION.

MENU Mode is entered by pressing and holding ENTER for three seconds.

The ► button is used to change the position of the blinking cursor. When the desired menu is blinking, press ENTER.

In the selected menu, use the ▲ and ▼ keys to navigate through the menu. Use the ▲, ▼ and ► keys to edit the selected item (see Menu Navigation discussion, page 24).

To save the new selection, press the ENTER key. A message displaying “Saving…” will be displayed for 3 seconds. After this message is displayed, the newly selected value will be displayed, if applicable.

**Password Overview**

The password is often required to start editing. Once entered correctly, this password will not be needed for subsequent edits. However, once the menu system is exited, the password will again be required when edit mode is re-entered.

Your choice of password (STD or CODE) is selected in the Options Mode.

**STD:**
The standard (STD) password is ▲▲▲▼, pressed in sequence. This password is designed to protect the 9900 from unintentional changes. It is best suited for systems where a group of people need to be able to change settings.

**CODE:**
The CODE default setting is 0000, adjustable to any 4-digit numerical code up to 9999. Using a personal code provides the maximum degree of security. This code can be modified in the Options mode.

**Error Handling**

Errors occurring while in the VIEW Mode show a specific message (e.g., CHECK SENSOR). This message is displayed every 10 seconds and stays on for 5 seconds. Once the error is resolved or cleared, the error message stops.

**Scrolling**

In some cases, more than one message or measurement may need to be displayed. This is accomplished by alternating the message portions across the screen.
**BATCH Setup Checklist**
1. Set the Units of Measure in Input Menu.
2. Set Flow Timebase in Input Menu.
3. Set Sensor Type (Freq or S3L) in Input Menu.
4. Set Batch Size in Input Menu.
5. Set K-Factor (pulses per Unit Volume) from Flow Sensor manual in CAL Menu.
6. Set up relay functions and other settings for your own application.

**VIEW Mode Menu - Batch Running**

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAL 5</td>
<td><strong>Stop Running Batch</strong> Press ENTER to stop batch that is running. Note: ENTER button stops batch in any screen on VIEW Mode.</td>
</tr>
<tr>
<td>Min 475</td>
<td><strong>Time Left</strong> displays estimated time remaining (in minutes) until batch is completed.</td>
</tr>
<tr>
<td>% 5</td>
<td><strong>Percent Complete</strong> displays percent remaining or percent completed of running batch. Count direction based on COUNT UP/DOWN setting in INPUT menu.</td>
</tr>
<tr>
<td>GPM 20</td>
<td><strong>Flow Rate</strong> displays current flow rate of running batch.</td>
</tr>
<tr>
<td>mA 480</td>
<td><strong>Output Current</strong> displays the output loop current in milliamperes (mA).</td>
</tr>
<tr>
<td>Gal 199.9</td>
<td><strong>Source Volume</strong> displays the calculated remaining source volume. Shown if SOURCE VOLUME is ON.</td>
</tr>
<tr>
<td>RLY 1 2 3</td>
<td><strong>Relay Status</strong> displays relay status for Relays 1, 2 and 3. One of three states (OFF, ON, PLS) for each relay will be displayed.</td>
</tr>
</tbody>
</table>
**Start Batch** Press Up or Down arrows to select the desired batch number. Press ENTER to start selected batch. Selected batch alternately displays on the bottom line of the display. (Confirmation screen or password screen are user-selectable in INPUT menu.) Available batches determined by the number of stored batches whose size is not zero.

**Resume/Cancel Batch** Displays when a batch is stopped without completing. Press the ► key to select either RESUME or CANCEL and then press ENTER to either resume the batch or cancel it. A confirmation or password screen for resuming a batch is user selectable. This screen will not display if the batch reaches completion.

**Override Batch** occurs when the user temporarily changes a batch size in View Mode. The change is temporary and is only active until a batch is run. After any batch is run, an overridden batch reverts back to its stored size. Only one batch can be overridden at a time. If the user overrides a second batch, the first overridden batch will revert to its stored size. The batch name will display OVERRIDE while it is overridden. A batch is overriden by pressing ► to edit the batch size.

**Manual Batch** is used for “topping off” a batch. The Batch Controller will open the valve as long as the user simultaneously holds down the ▼ and ► keys.

**Note:** A manual batch will cancel a batch in the RESUME/CANCEL state.

**Source Volume** shows the calculated remaining source volume. Displays if SOURCE VOLUME is ON. Reset source volume with ► key.

**Note:** If PWD REQUIRED is set to YES, you may be prompted to enter your password. PWD REQUIRED setting can be changed in the OPTIONS menu.

**Reset Volume** Confirmation screen for resetting SOURCE VOLUME. Press ▲ or ▼ to select YES and press ENTER to reset source volume.

**Resettable Totalizer** displays the resettable totalizer. Press ► to reset the totalizer. **Note:** If PWD REQUIRED is set to YES, you may be prompted to enter your password. PWD REQUIRED setting can be changed in the OPTIONS menu.

**Reset Total?** Confirmation screen for clearing the resettable Totalizer. Press ▲ or ▼ to select YES and press ENTER.

**Permanent Totalizer** displays the Permanent Totalizer value (note the "P" indicating Permanent). Pressing ► displays units of measure.

**Overrun** displays the amount of overrun volume detected after the 9900-1BC deactivates the batch relay, triggering valve closure. Overrun resets each time a new batch starts.

**Batch Count** shows the number of batches which have run to at least 90% of completion. Press ► to reset Batch Count. **Note:** If PWD REQUIRED is set to YES, you may be prompted to enter your password. PWD REQUIRED setting can be changed in the OPTIONS menu.

**Reset Count?** Confirmation screen for clearing the Batch Count. Press ▲ or ▼ to select YES and press ENTER.

**Customizable Label** is the View name assigned to the 9900. Default is BATCH for 9900-1BC.
### CAL Menu

**K-Factor** Set K-Factor (pulses per unit volume) according to Flow Sensor manual. Min: 0.0001, Max: 999999. Cannot be zero. Default = 60.0000.

In Simple Mode, the K-Factor will be used for all batches. In Advanced Mode, there is one K-Factor for each stored batch. See NOTE in Calibration section for Volume Calibration procedure.

**T-Factor** sets the volume of each count of the Totalizer as a multiple of the volume unit of the K-Factor. Min: 0.0001, Max: 999999. Cannot be zero. Default = 1.0000.

**Volume Calibration** Enter the dispensed volume so the 9900 can calculate a K-Factor. Refer to Volume Calibration section on page 24 for procedure.

**Select Overrun Compensation** (ADVANCED Mode only) Automatic or Manual.

**Automatic Overrun Compensation** (ADVANCED Mode only) measures flow during the batch cycle and any excess flow after the batch stops is considered an overrun. The batch controller then automatically reduces the next batch size by the overrun value. For the next batch the batch contact will de-energize early, closing the flow control valve early and eliminating batch overrun.

**Manual Overrun Compensation** (ADVANCED Mode only) When Manual Compensation is enabled, a batch will be stopped when the dispensed batch volume reaches an amount equal to the batch size volume minus the Manual Overrun Compensation volume.

**Calibration Date** Enter date of calibration (mm-dd-yyyy) and initials of calibrator (ii).

### INPUT Menu

**Customize Label** If desired, a custom name can be entered. Enter 13-character string. Default = BATCH.

**Freq or S3L** If your flow sensor is configured for frequency output, select FREQ. If configured for Digital (S3L) output (recommended), select S3L. Default = FREQ.

**Batch Size** Set batch size and batch name of up to ten stored batches. Setting batch size to zero hides the batch in VIEW Mode. One batch must be non-zero.

**Note:** Same batch names can be assigned to multiple batches.

**Batch Units** Enter up to four characters to define Batch Units. Default = GAL. (Actual calculations are determined by the K-Factor). Divide this unit by Flow Timebase to get Flow Units.

**Totalizer Units** Identifies the Totalizer Units. It has no effect on any calculation. Default = GALLONS.

**Flow Units** Identifies the Flow Units. It has no effect on any calculation. Flow Units equal Batch Units divided by Flow Timebase. Default = GPM.

**Flow Timebase** Select S (seconds), M (minutes), H (hours), or D (days). Default = M.

**Batch Confirmation** Select Batch Confirmation option. Choose ON, OFF, or PWD (password). Default = OFF.
**INPUT Menu**

**Mode Select** Select ADVANCED or SIMPLE Mode. ADVANCED Mode enables additional features in RELAY and LOOP Modes. Default = SIMPLE.

**Count Up/Down** Select count direction of Batch Volume and Percent Complete (Source Volume always counts down). Default = Count Up. Note: If Count Down is selected, Dispensed volume and Source volume can display negative values.

**Missing Signal?** Determines if a Batch is stopped when No Flow is detected. If YES is selected, Batch will be stopped; if NO is selected, Batch will continue. Default = NO. Note: This setting is independent of Relay Mode - MISSING; see page 20.

**Set On Delay** Shown if MISSING SIGNAL is set to YES. Set desired ON delay time in seconds. Default = 6 sec.

**Select Batch Type** To change desired instrument type (i.e., Flow, pH, etc.). The bottom line will display ALL SETTINGS WILL BE RESET. ARE YOU SURE? The top line of the display will blink NO. Press ▼ or ▲ to select YES. Press ENTER again to finalize your selection. For other 9900 instruments, BATCH will be displayed only when the Batch Module is installed.

**LOOP Menu**

**Loop Source** In ADVANCED Mode, select COMPLETION or FLOW RATE. In SIMPLE Mode, only COMPLETION is available for the loop source.

**mA at Completion** Shown if COMPLETION is selected. Enter mA value to be output when batch is completed. Select 4.0 mA or 20 mA.

**Error Value** Shown if COMPLETION is selected. Set desired Loop output value when sensor error (e.g., bad sensor, broken wire) is detected. Select 3.6 mA, 22 mA, NONE. Default = 3.6.

**4 mA Setpoint** Shown if FLOW RATE is selected. Set flow rate value corresponding to desired 4 mA output. Default = 0.

**20 mA Setpoint** Shown if FLOW RATE is selected. Set flow rate value corresponding to desired 20 mA output. Default = 100.

**Adjust 4 mA** Allows fine-tuning to compensate for errors in other equipment connected to the 9900. The display value represents the precise current output. Adjustment limits: 3.80 mA to 5.00 mA. Default = 4.00 mA.

**Adjust 20 mA** Allows fine-tuning to compensate for errors in other equipment connected to the 9900. The display value represents the precise current output. Adjustment limits: 19.00 mA to 21.00 mA. Default = 20 mA.

**Test Loop** Press ▲ or ▼ to manually output a current value from 3.6 mA to 21.00 mA to test the output loop.
### RELAY Menu

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1 Normal Open/Closed</td>
<td>Set Open Collector (R1) as Normally Open or Normally Closed. Default = NORMAL OPEN.</td>
</tr>
<tr>
<td>Relay Mode</td>
<td>Select the desired mode of operation for the open-collector (R1) output. Simple Mode: BATCH, VOL PULS, MISSING. Advanced Mode: OFF, BATCH, HI FLOW, VOL PULS, EOB PULS, MISSING, OVERRUN, SRC VOL (if SOURCE VOL is set to ON; see OPTIONS menu), TOT VOL, TWO STG, MULTIPLE, ERROR. Defaults: Relay 1 = VOL PULS; Relay 2 = BATCH; Relay 3 = MISSING. <strong>Note:</strong> Same Relay Modes are available for Relays 2 and 3. See pages 10-12.</td>
</tr>
<tr>
<td>Test Relay</td>
<td>Select OFF or ON to test relay.</td>
</tr>
<tr>
<td>View Remote Button Status</td>
<td>Press ► to view status of remote buttons.</td>
</tr>
<tr>
<td>Remote Button Status</td>
<td>Displays status of Remote Buttons: STA (Start), STP (Stop), RES (Resume). 1 = pressed, 0 = not pressed. Press ENTER to exit.</td>
</tr>
<tr>
<td>Set Flow</td>
<td>In HI FLOW Mode, set flow value to activate relay.</td>
</tr>
<tr>
<td>Set Hysteresis</td>
<td>Prevents the system from chattering around the set point. In HI FLOW Mode, Relay is energized at Set Flow value and will be de-energized at Set Flow value minus Hysteresis value.</td>
</tr>
<tr>
<td>Set On Delay</td>
<td>In HI FLOW, ERROR, and MISSING Modes, set desired ON delay. Default = 5 sec.</td>
</tr>
<tr>
<td>Stop Batch?</td>
<td>In HI FLOW, MISSING, MULTIPLE, and ERROR Modes, determines if a Batch is stopped when a Relay Activates. If YES is selected, Batch will be stopped; if NO is selected, Batch will continue. Default = YES.</td>
</tr>
<tr>
<td>Set Overrun Volume</td>
<td>In OVERRUN and MULTIPLE Modes, set desired Overrun Volume. <strong>Note:</strong> Overrun Volume must be greater than Manual Overrun Compensation, otherwise the Overrun Alarm will activate at the end of every batch.</td>
</tr>
<tr>
<td>Set Totalizer Volume</td>
<td>In TOT VOL Mode, set desired totalizer volume. <strong>Note:</strong> This volume is resettable and totalizer volume must be reset to clear relay. (see Resettable Totalizer, page 17)</td>
</tr>
<tr>
<td>Set Pulse Volume</td>
<td>In VOL PULS Mode, set desired volume.</td>
</tr>
<tr>
<td>Set Pulse Width</td>
<td>In VOL PULS Mode, set desired pulse width.</td>
</tr>
</tbody>
</table>
### RELAY MULTIPLE Mode options (see discussion on page 12)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>Missing Signal On/Off Energizes selected relay if signal is missing. Select ON or OFF.</td>
</tr>
<tr>
<td>R1 MISS</td>
<td>Overrun On/Off Energizes selected relay if overrun occurs. Select ON or OFF.</td>
</tr>
<tr>
<td>R1 HI FLOW</td>
<td>Hi Flow On/Off Energizes selected relay if Hi Flow condition occurs. Select ON or OFF.</td>
</tr>
<tr>
<td>R1 ERROR</td>
<td>Error On/Off Energizes selected relay if an error condition occurs. Select ON or OFF.</td>
</tr>
</tbody>
</table>

### RELAY TWO STAGE Mode option (see discussion on page 12)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td><strong>Main Relay Select</strong> (ADVANCED Mode only) Selects the specified relay as the main relay for two-stage valve control. This relay will be de-energized when the batch volume reaches the setpoint percentage.</td>
</tr>
<tr>
<td>95</td>
<td><strong>Setpoint Percent Select</strong> Selects the percentage of batch volume at which the main relay will be de-energized. Default = 95%.</td>
</tr>
<tr>
<td>R2 BYPASS</td>
<td><strong>Bypass Relay Select</strong> Selects the specified relay as the Bypass relay for two-stage valve control. This relay will remain energized while the batch is running.</td>
</tr>
<tr>
<td>IN BYPASS</td>
<td><strong>Relay Bypassed</strong> The specified relay is in Bypass.</td>
</tr>
</tbody>
</table>

**Note:** A relay is taken out of bypass using the Bypass select screen, found under the relay which is in TWO STG Mode.
### OPTION Menu

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contrast</strong></td>
<td>Adjust the LCD contrast for best viewing. A setting of 1 is lowest contrast, 5 is highest. In general, select lower contrast if the display is in warmer surroundings. Default = 3.</td>
</tr>
<tr>
<td><strong>Backlight</strong></td>
<td>Adjust backlight level. Select OFF, LOW, HIGH or AUTO. Default = AUTO.</td>
</tr>
<tr>
<td><strong>Batch Decimal</strong></td>
<td>Set the decimal to the best resolution for your application. The display will automatically scale up to this resolution. Select -----., ----.-, ---.-- or --.---. Default = ----.-.</td>
</tr>
<tr>
<td><strong>Total Decimal</strong></td>
<td>Set the decimal to the best resolution for the Permanent Totalizer display. The display will automatically scale up to this resolution. Select -----., ----.-, ---.-- or --.---. Default = ----.-.</td>
</tr>
<tr>
<td><strong>PWD REQUIRED</strong></td>
<td>Requires password to reset TOTALIZER, BATCH OVERRIDE, SOURCE VOLUME reset, and BATCH COUNT reset. Select YES/NO. (Does not affect Permanent Totalizer.) Default = YES.</td>
</tr>
<tr>
<td><strong>Source Volume</strong></td>
<td>Selects SOURCE VOLUME display option. Choose ON or OFF. Default = OFF.</td>
</tr>
<tr>
<td><strong>Volume Reset</strong></td>
<td>If SOURCE VOLUME is ON, set the reset value for the source volume. Default = 1000 GAL.</td>
</tr>
<tr>
<td><strong>Bar Graph Source</strong></td>
<td>If SOURCE VOLUME is ON, select source for Bar Graph (choose BATCH VOLUME or SOURCE VOLUME). If SOURCE VOLUME is OFF, Bar Graph source is the batch volume. Default = BATCH VOLUME.</td>
</tr>
<tr>
<td><strong>Password Type</strong></td>
<td>Select STD or CODE. Default = STD.</td>
</tr>
<tr>
<td><strong>Set Code</strong></td>
<td>If CODE is selected in PASSWORD TYPE, enter desired password code. 4-character entry not displayed, ---- displayed instead.</td>
</tr>
<tr>
<td><strong>Memo</strong></td>
<td>Enter 13-character string, if desired.</td>
</tr>
<tr>
<td><strong>Remote Setup</strong></td>
<td>Enables Remote Setup to configure the 9900 via a computer and the PC COMM tool. Press ► and select YES to enable. REMOTE SETUP flashes when mode is enabled. Refer to the PC COMM Configuration/Diagnostic Tool manual, 3-0251.090, included with your PC COMM tool.</td>
</tr>
<tr>
<td><strong>Version Level</strong></td>
<td>Displays Transmitter Generation. Batch Module (3-9900.397) requires Generation II, or later, 9900 transmitter.</td>
</tr>
</tbody>
</table>
## Error Messages

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO BATCH MODULE</td>
<td>Remote Batch Module is missing.</td>
</tr>
<tr>
<td>NO SENSOR</td>
<td>No signal from Flow Sensor.</td>
</tr>
<tr>
<td>EXTERNAL STOP IS ACTIVE</td>
<td>External Stop signal is preventing batch start or Remote Stop button is held down.</td>
</tr>
<tr>
<td>CHANGE BYPASS ON 2STG RELAY</td>
<td>Bypass relay must be set on Bypass Relay Select option, under the Relay Menu. See page 21, under Relay Two Stage mode.</td>
</tr>
<tr>
<td>% MUST BE MORE THAN 0</td>
<td>Main relay shutoff percentage cannot be zero.</td>
</tr>
<tr>
<td>ERROR VOLUME TOO LOW</td>
<td>Volume entered during Volume Calibration is too low to calculate a K-Factor.</td>
</tr>
<tr>
<td>ERROR NEW KF OUT OF RANGE</td>
<td>K-Factor error during volume calibration.</td>
</tr>
<tr>
<td>VALUE MUST BE MORE THAN 0</td>
<td>Value cannot be zero.</td>
</tr>
<tr>
<td>1 BATCH MUST BE NONZERO</td>
<td>At least one batch must have a non-zero volume.</td>
</tr>
<tr>
<td>MANUAL COMP TOO HIGH</td>
<td>Batch size is less than or equal to Manual Compensation value.</td>
</tr>
<tr>
<td>OVR</td>
<td>Manual overrun compensation is greater than or equal to the size of at least one of the stored batches.</td>
</tr>
</tbody>
</table>

## Alarm Acknowledgement Messages

<table>
<thead>
<tr>
<th>Alarm Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERRUN ALARM PRESS ENTER</td>
<td>Overrun was detected.</td>
</tr>
<tr>
<td>HI FLOW ALARM PRESS ENTER</td>
<td>High flow was detected.</td>
</tr>
<tr>
<td>ERROR ALARM PRESS ENTER</td>
<td>No S3L communication or a sensor was detected.</td>
</tr>
<tr>
<td>MISSING SIG PRESS ENTER</td>
<td>No flow was detected.</td>
</tr>
</tbody>
</table>
**Volume Calibration Procedure**

1. Press ENTER to start the volumetric calibration period. The 9900 activates the BATCH Relay and starts counting pulses from the flow sensor.
2. Press ENTER to stop the volumetric calibration period. The 9900 deactivates the BATCH Relay and stops counting pulses from the flow sensor.
3. Enter the volume of fluid known to have flowed past the sensor during the volumetric calibration period. This will modify the existing K-Factor.
4. The 9900 displays the newly calculated K-Factor for your reference. **NOTE:** If the calculated K-Factor is less than 0.0001 or greater than 999999 (out of range at either extreme), the 9900 displays "ERROR VOLUME TOO HIGH" (or LOW) and returns to VOLUME CAL.
5. Press ENTER to accept the new K-Factor (9900 displays "SAVING") or press \[▲ + ▼\] keys simultaneously to escape without saving and return to Enter Volume.

**NOTE:**
- You may enter your own calculated K-Factor in the CAL menu.
- In Simple Mode, the calculated K-Factor will replace the current K-Factor.
- In Advanced Mode, the calculated K-Factor value will replace the first K-Factor.
- A K-Factor can be calculated for each batch. Repeat steps 1-5 for each batch and enter calculated K-Factor for the corresponding batch.

**NOTE:** In Advanced Mode the Batch Controller has a separate K-Factor for each stored batch. In Simple Mode the stored batches use a common K-Factor. If you switch from Simple Mode to Advanced Mode, the single K-Factor will be copied to the K-Factor for each batch.

If you switch from Advanced Mode to Simple Mode, the K-Factor for Batch 1 will be copied to the single K-Factor used for all batches.
Specifications

**General**
Input channels ..................... One

**Enclosure and Display**
Case Material ...................... PBT
Window ................................ Shatter-Resistant Glass
Keypad ................................ 4 buttons, injection-molded silicone rubber seal
Display ................................ Backlit, 7- and 14-segment "Dial-type" digital bar graph
Update rate .......................... 1 s
LCD Contrast ....................... 5 settings

Enclosure
Size...................................... ¼ DIN
Color.................................... Black

Mounting
Panel ................................... ¼ DIN, ribbed on four sides for panel mounting clip inside panel
Wall........................................ Large enclosure (sold as an accessory) that encases the transmitter

**Performance Specifications**
Accuracy ......................... ±0.2%
System Response:
• Primarily dependent upon the sensor. Transmitter adds a maximum 150 ms processing delay of the sensor electronics.
• Minimum update period is 100 ms.
• System response is tempered by the display rate.

**Shipping Weights**
Base Unit ................................ 0.63 kg (1.38 lb)
Batch Module ......................... 0.16 kg (0.35 lb)
Relay Module ........................ 0.19 kg (0.41 lb)

**Environmental Requirements**
Ambient operating temperature:
Backlit LCD .......................... -10 °C to 70 °C
(14 °F to 158 °F)
Storage Temp .......................... -15 °C to 70 °C
(5 °F to 158 °F)
Operating Temp ........................ -10 °C to 70 °C
(14 °F to 158 °F)
Relative Humidity .................. 0 to 100% condensing for front only;
0 to 95% non-condensing for back side.
Maximum Altitude .................. 4,000 m (13,123 ft)
Enclosure Rating .................... Designed to meet NEMA 4X/IP65 (front face only).

**Standards and Approvals**
CE, UL, CUL
RoHS compliant
China RoHS (visit gfsignet.com for details)

This device complies with Part 15 of the FCC rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.
### Specifications

#### Electrical Requirements

**Power to Sensors:**
- Voltage: +4.9 to 5.5 VDC @ 25 °C, regulated
- Current: 20 mA
- Short Circuit: Protected

**Terminal Blocks**
- Pluggable screw type
- 14 AWG max wire gauge

#### Input Power Requirements

**DC (preferred):**
- Voltage: +4.9 to 5.5 VDC, regulated
- Current: 20 mA
- Short Circuit: Protected

**Overvoltage protection:**
- 48 Volt Transient Protection Device

**Current limiting for circuit protection**

**Reverse-Voltage protection**

#### Loop Characteristics

**With DC power input (preferred)**
- Max. loop impedance:
  - @ 12 V loop power: 250 Ω max.
  - @ 18 V loop power: 500 Ω max.
  - @ 24 V loop power: 750 Ω max.

#### Relay Specifications

- **Hysteresis:** Adjustable (absolute in Engineering Units)
- **Latch:** Reset in test screen or View Mode
- **On Delay:** 9999.9 seconds (max)
- **Test Mode:** Set On or Off
- **Maximum pulse rate:** 400 pulses/minute
- **Volumetric Pulse Width:** 0.1 s to 3200 s

#### Open Collector

- **Type:** NPN
- **Max. Voltage Rating:** 30 VDC
- **Max. Current Rating:** 50 mA

#### Dry-Contact Relays

- **Type:** SPDT
- **Form:** C
- **Max. Voltage Rating:** 30 VDC or 250 VAC
- **Max. Current Rating:** 5 A
### Output Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>One 4 to 20 mA output</td>
<td></td>
</tr>
<tr>
<td>Current Loop Out</td>
<td>ANSI-ISA 50.00.01 Class H</td>
</tr>
<tr>
<td>Span</td>
<td>3.8 to 21 mA</td>
</tr>
<tr>
<td>Zero</td>
<td>4.0 mA factory set; user programmable from 3.8 to 4.2 mA</td>
</tr>
<tr>
<td>Full Scale</td>
<td>20.00 mA factory set; user programmable 19.0 to 21.0 mA</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 32 μA max. error @ 25 °C @ 24 VDC</td>
</tr>
<tr>
<td>Resolution</td>
<td>6 μA or better</td>
</tr>
<tr>
<td>Temp. Drift</td>
<td>± 1 μA per °C</td>
</tr>
<tr>
<td>Power Supply Rejection</td>
<td>± 1 μA per V</td>
</tr>
<tr>
<td>Short Circuit</td>
<td>Protected</td>
</tr>
<tr>
<td>Reverse Polarity</td>
<td>Protected</td>
</tr>
<tr>
<td>Update Rate</td>
<td>(1/frequency) + 150 ms nominal</td>
</tr>
<tr>
<td>Short circuit and reverse polarity protected</td>
<td>Adjustable span, reversible</td>
</tr>
<tr>
<td>Error Condition</td>
<td>Selectable error condition 3.6 or 22 mA or NONE</td>
</tr>
<tr>
<td>Actual update rate</td>
<td>Determined by sensor type Increment to desired current (range 3.6 to 21.00 mA)</td>
</tr>
<tr>
<td>OC Outputs</td>
<td>1</td>
</tr>
<tr>
<td>Analog Outputs</td>
<td>1 passive</td>
</tr>
<tr>
<td>Linear scaling</td>
<td></td>
</tr>
</tbody>
</table>
## 9900-1BC Batch Controller System

<table>
<thead>
<tr>
<th>Mfr. Part No</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-9900-1BC</td>
<td>159 001 770</td>
<td>9900-1BC Batch Controller System</td>
</tr>
<tr>
<td>3-9900-1P</td>
<td>159 001 695</td>
<td>9900 Panel Mount Transmitter</td>
</tr>
<tr>
<td>3-9900.393</td>
<td>159 001 698</td>
<td>Relay Module - 2 DCR (dry-contact relays)</td>
</tr>
<tr>
<td>3-9900.397</td>
<td>159 310 163</td>
<td>Batch Module</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Mfr. Part No</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-9900-1BC.090-CD</td>
<td>159 900 151</td>
<td>Batch Controller System product manual CD</td>
</tr>
<tr>
<td>6682-1102</td>
<td>159 001 710</td>
<td>DC Power Plug, 2 Pos, Right Angle</td>
</tr>
<tr>
<td>6682-1103</td>
<td>159 001 711</td>
<td>Relay Module Plug, 3 Pos, Right Angle</td>
</tr>
<tr>
<td>6682-1104</td>
<td>159 001 712</td>
<td>Loop Power Plug, 4 Pos, Right Angle</td>
</tr>
<tr>
<td>6682-3004</td>
<td>159 001 725</td>
<td>Freq/S3L Plug, 4 Pos, In-Line</td>
</tr>
<tr>
<td>6682-3104</td>
<td>159 001 713</td>
<td>Freq/S3L Plug, 4 Pos, Right Angle</td>
</tr>
<tr>
<td>7300-7524</td>
<td>159 000 687</td>
<td>24 VDC power supply 7.5 W, 300 mA</td>
</tr>
<tr>
<td>7300-1524</td>
<td>159 000 688</td>
<td>24 VDC power supply 15 W, 600 mA</td>
</tr>
<tr>
<td>7300-3024</td>
<td>159 000 689</td>
<td>24 VDC power supply 30 W, 1.3 A</td>
</tr>
<tr>
<td>7300-5024</td>
<td>159 000 690</td>
<td>24 VDC power supply 50 W, 2.1 A</td>
</tr>
<tr>
<td>7300-1024</td>
<td>159 000 691</td>
<td>24 VDC power supply 100 W, 4.2 A</td>
</tr>
<tr>
<td>3-0251</td>
<td>159 001 724</td>
<td>PC COMM Configuration/Diagnostic tool</td>
</tr>
<tr>
<td>3-9900.390</td>
<td>159 001 714</td>
<td>Standard Connector Kit, Right Angle</td>
</tr>
<tr>
<td>3-9900.391</td>
<td>159 001 715</td>
<td>Connector Kit, In-Line</td>
</tr>
<tr>
<td>3-9900.392</td>
<td>159 001 700</td>
<td>Wall Mount Accessory</td>
</tr>
<tr>
<td>3-9000.392-1</td>
<td>159 000 839</td>
<td>Liquid Tight Connector Kit, NPT (1 pc.)</td>
</tr>
</tbody>
</table>