



Signet 9900-1BC Batch Controller System



3-9900-1BC.090-1 Rev. A1 03/13 English

Product Manual



Panel Mount

Look for the **Quick Start** icon to quickly set up your new 9900-1BC.



Safety



WARNING!

- 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 input and output connections.
- Wiring connections to this product should only be performed by qualified personnel.
- Do not use unit if display is cracked or broken.

Compatibility

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:

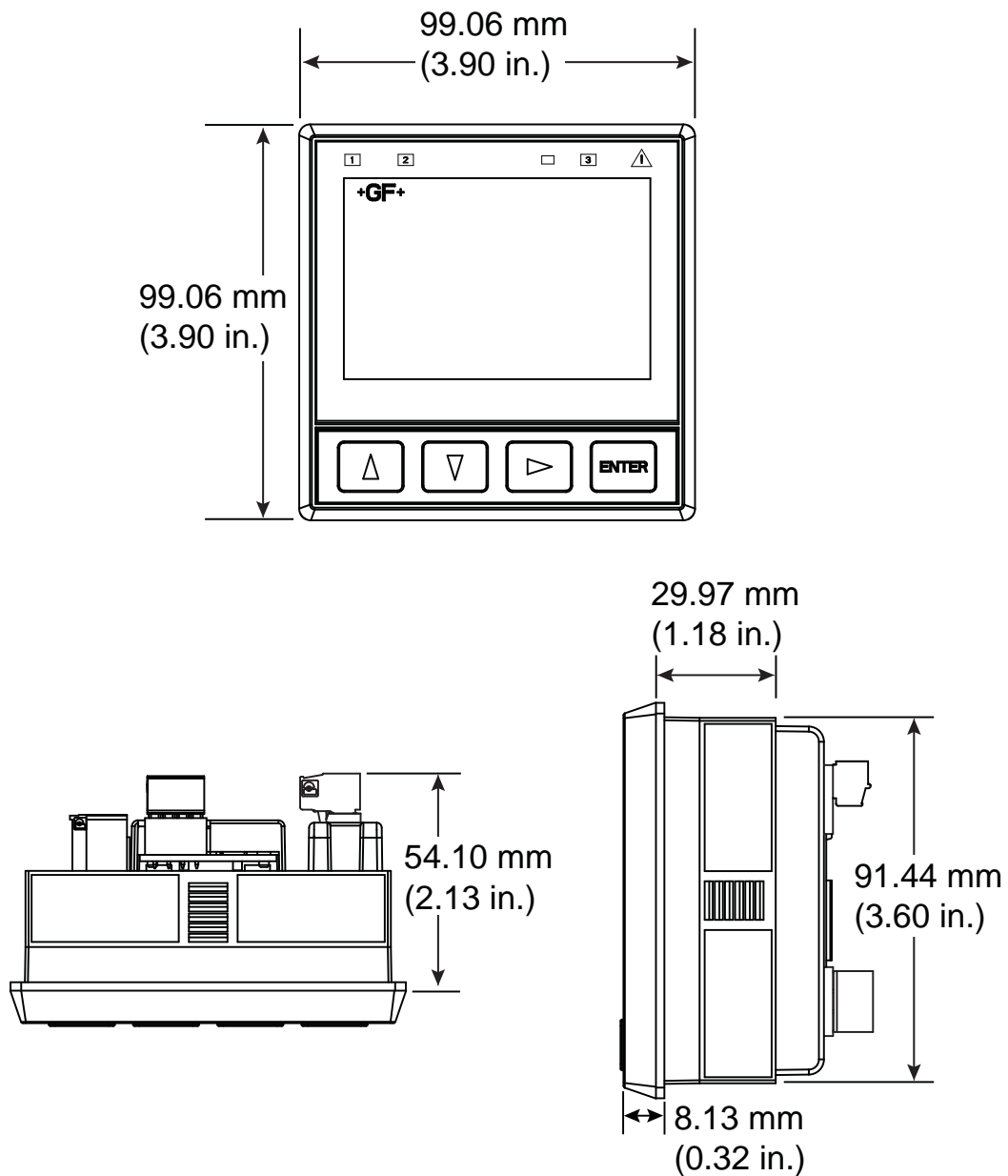
- Signet 9900 Transmitter (Generation II) 3-9900-1P
- Signet Relay Module 3-9900.393
- Signet Batch Module 3-9900.397

Note:

Verify 9900 Transmitter version level under the OPTIONS Menu

Dimensions

3-9900-1BC Batch Controller System



3-9900-1BC Batch Controller System

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)** ►



Do not mount in direct sunlight.

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

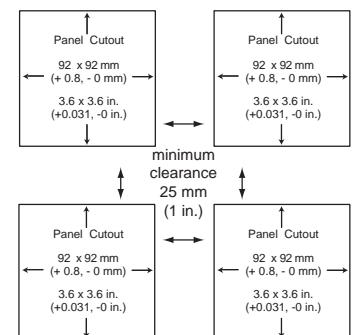
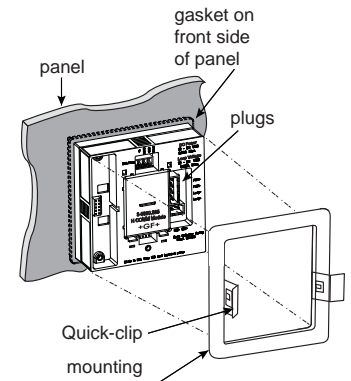
The Panel Mount unit can be installed in the optional Wall Mount Accessory (3-9900.392, 159 001 700), for field mount installation.



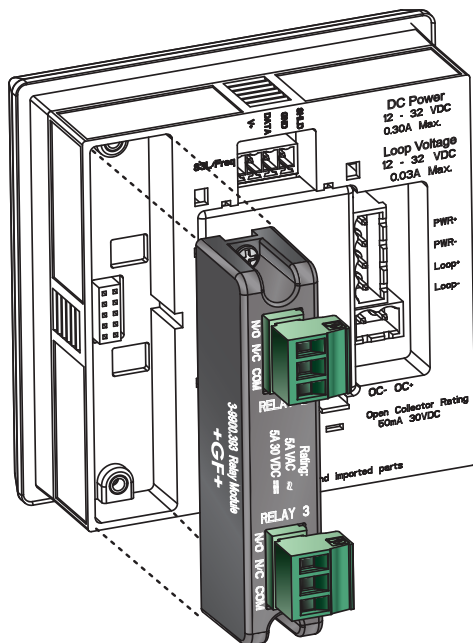
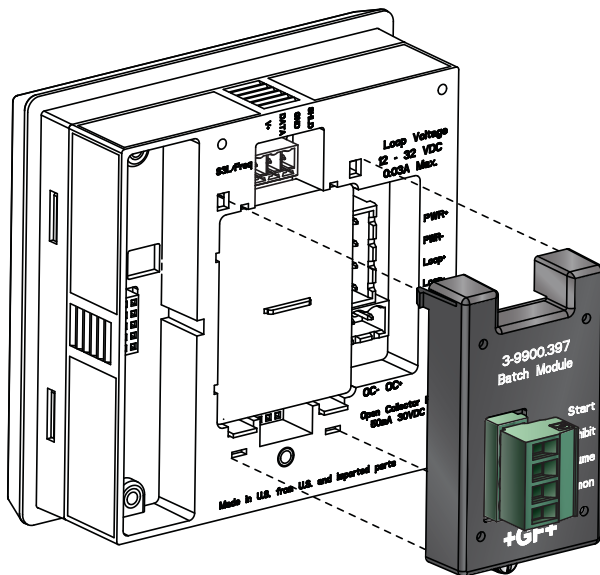
CAUTION:

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.



Modules



- The Indicator LEDs on the front panel of the 9900-1BC show the status of Open Collector (relay 1) and relays 2 and 3.
- Hysteresis and time delay are adjustable for each relay.

Batch Module

Convert a 9900 Transmitter (Generation II) 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

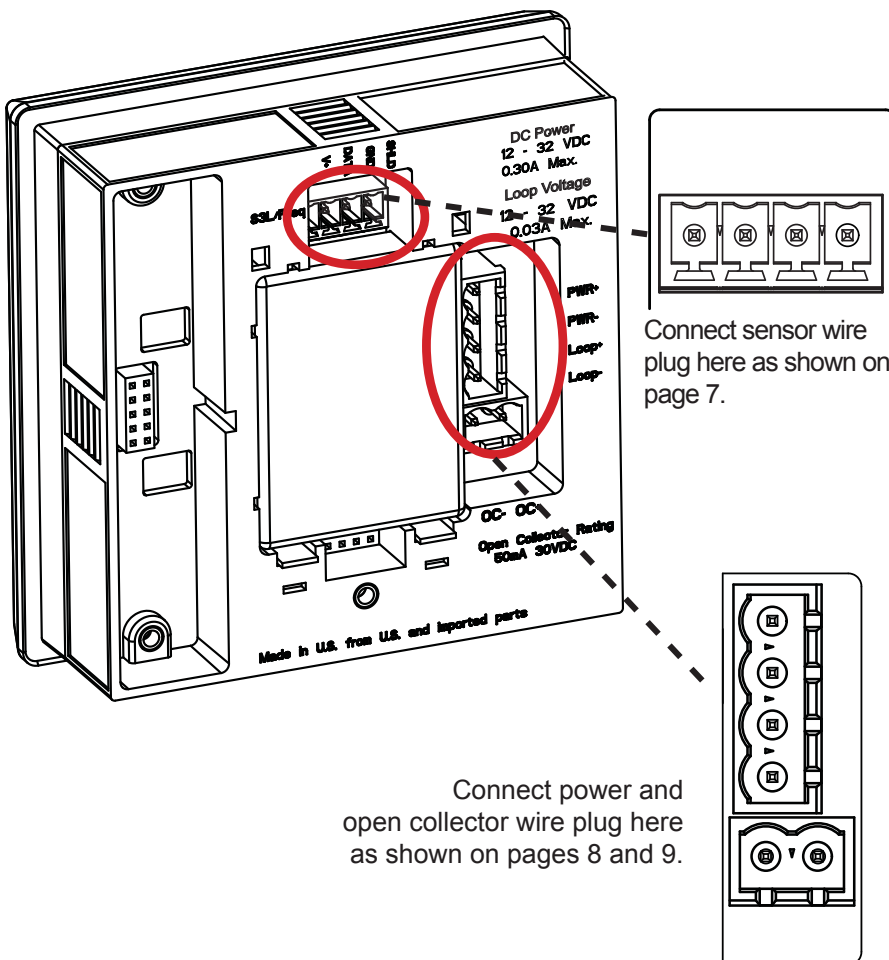
- Passive 4 to 20 mA output

Terminals 5-6: Open Collector

- Software selectable for Normally Open or Normally Closed

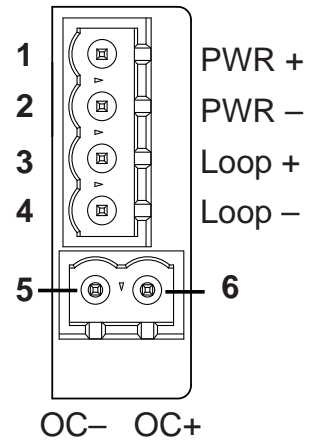
Terminals 7-10: Digital (S³L)/Frequency Input

- For sensor wiring
- PC COMM wiring

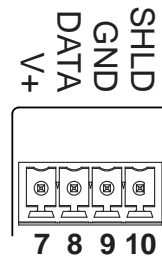


The 9900-1BC requires regulated 10.8 to 35.2 VDC (24 VDC nominal) from an external power supply. Maximum current draw is 300 mA.

Power



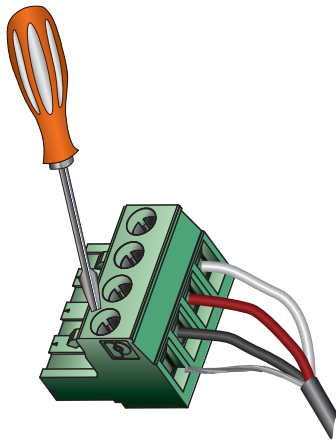
Digital (S³L)/Frequency





Tools Required

- Phillips screwdriver
- Flat-head screwdriver
- Wire strippers



Wiring

► 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.

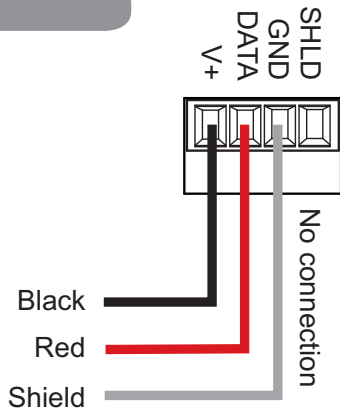


CAUTION:
Avoid Electrostatic Discharge (ESD)

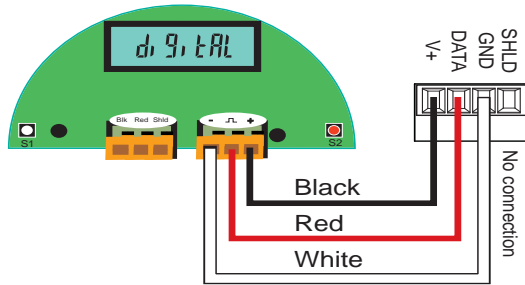
- Minimize handling of plug-in modules to reduce the possibility of damage due to ESD.
- Handle modules by the edges. Never touch any exposed circuitry or contacts.
- Wear an anti-static wristband or stand on an anti-static mat, or keep one hand touching a properly grounded pipe or other properly grounded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

Sensor Wiring

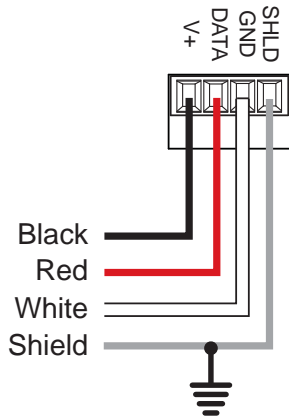
515 (8510), 525,
2000, 2100, 2507,
2536 (8512), 2540



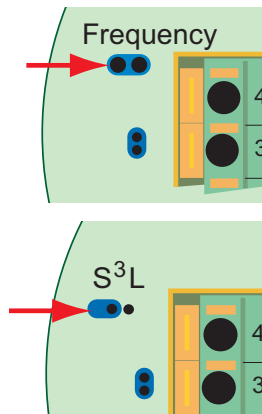
2537



2551*

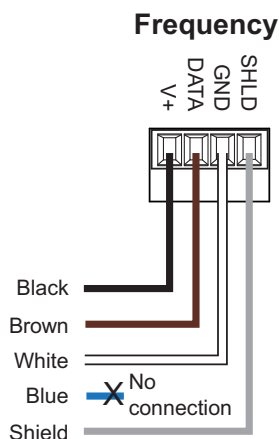
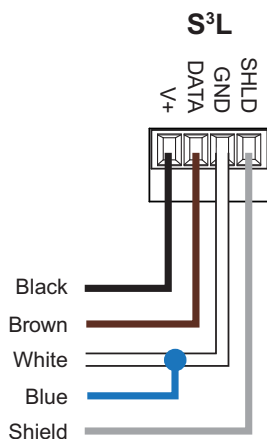


Connect the silver (shield) wire to earth ground in case of EMI noise interference.



*2551 Blind Magmeter Output Selection Jumpers

2552



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.

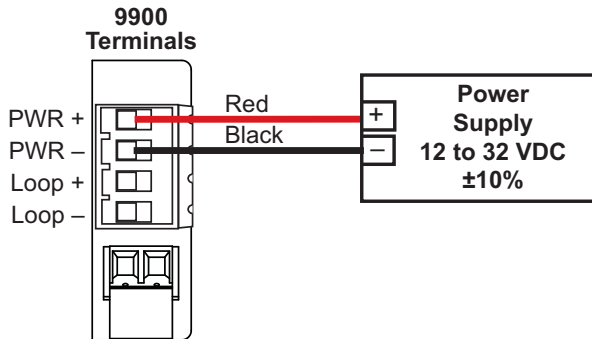
Power Wiring



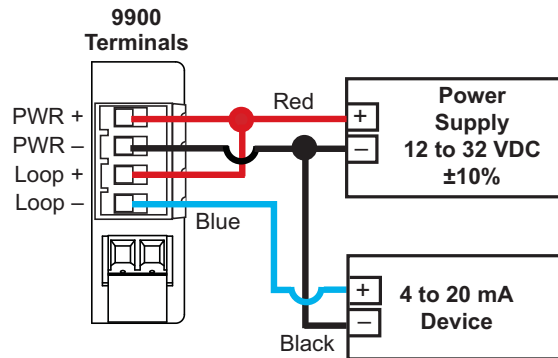
CAUTION!

DO NOT connect your 9900 to AC power.
The 9900 MUST be powered by 10.8-35.2 VDC ONLY.

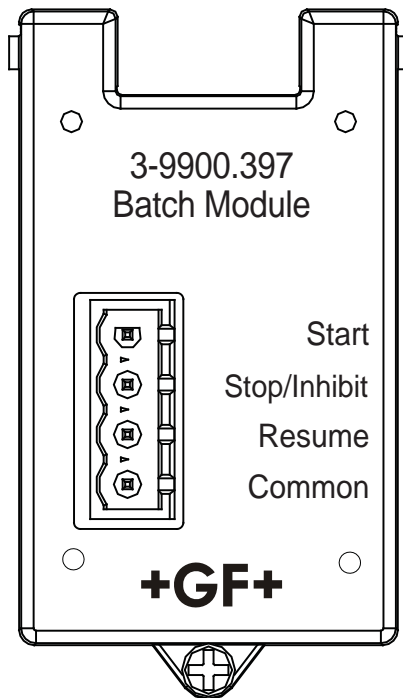
Stand-alone application



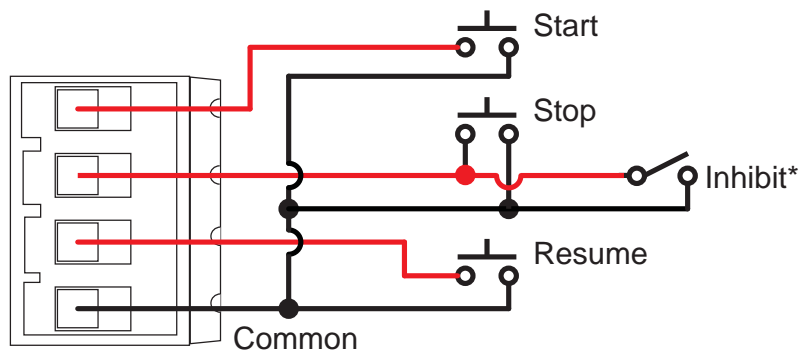
Connection to a 4 to 20 mA device



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.

Relay and Open Collector Wiring

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

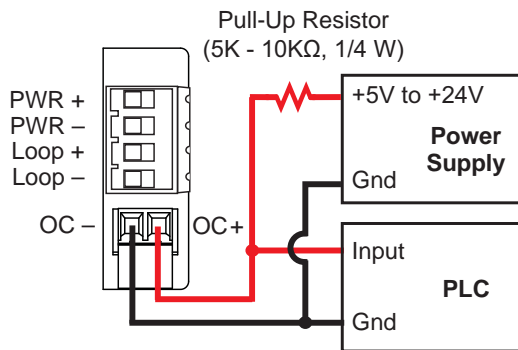
No matter the setting, the Open Collector output turns off if the 9900 loses power. This must be taken into account when evaluating system failure consequences. If the system layout requires a “closed” or “on” condition for the output in case of power loss, a mechanical dry-contact relay (NC contacts)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

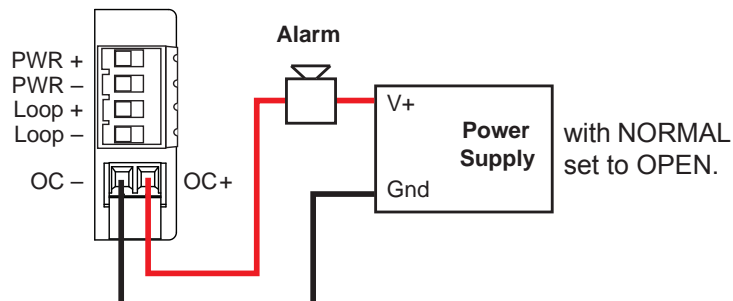
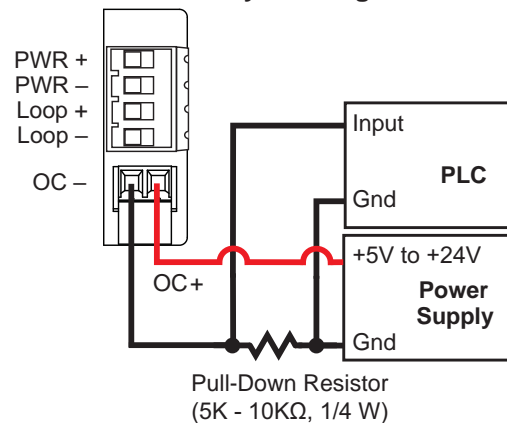
Most indicating instruments or control system inputs require a signal voltage of 0 to 5 V (TTL or CMOS logic levels) or 0 to 24 V. Therefore, the 9900 Open Collector output circuits must be equipped with a pull-up or pull-down resistor (not supplied), and a quality regulated 5 to 24 V (depending on the 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

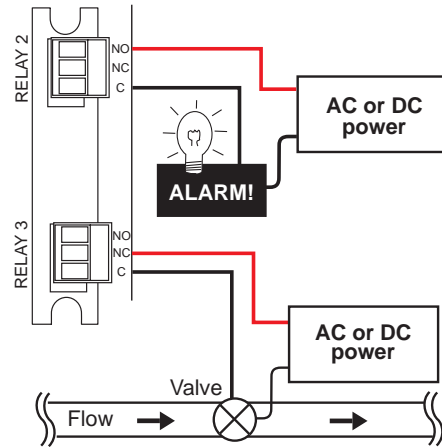


Relay Module Wiring

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*:

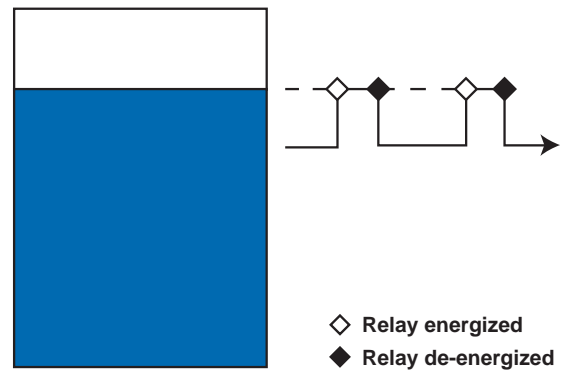
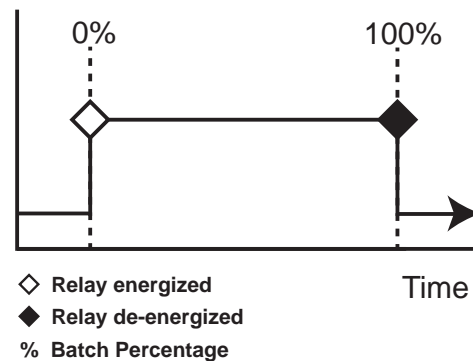
Activates relay while batch is running.

*Simple Mode

(See Input Menu - Page 17)

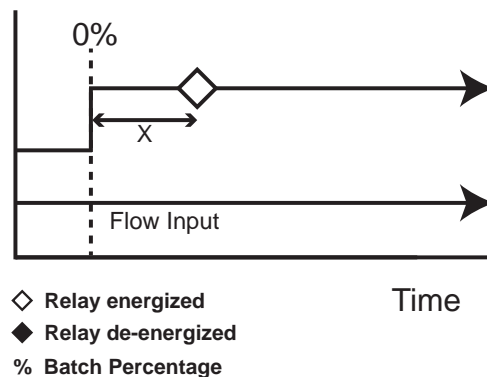
VOL PULS – Volumetric Pulse*:

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.



Relay Mode Settings - continued

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, pg. 19).

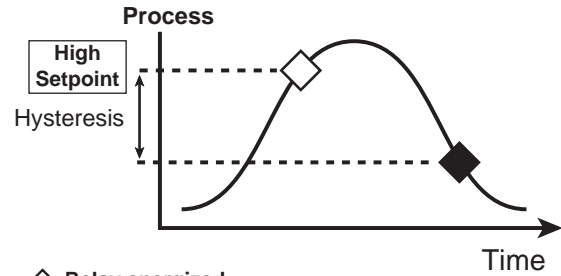
Note: The Overrun Alarm Volume must be greater than the Manual Compensation Volume. If the Overrun Alarm Volume is less than or equal to the Manual Compensation Volume, the Overrun Alarm will activate on every batch.

SRC VOL – Source Volume:

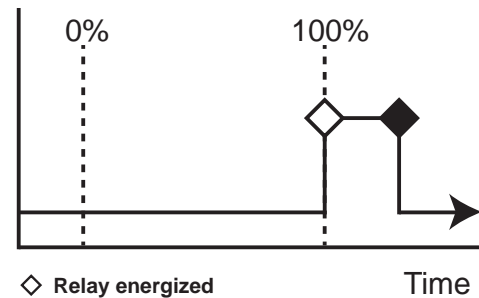
Activates relay when Source Volume falls to specified volume (*only available when "Source Volume" is ON*)

Advanced Mode

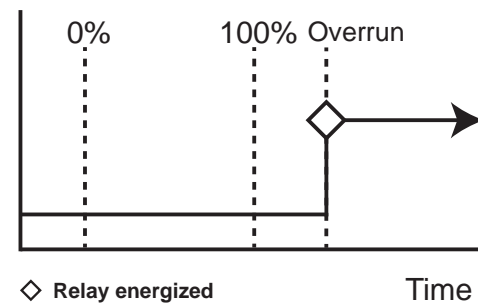
(See Input Menu - Page 17)



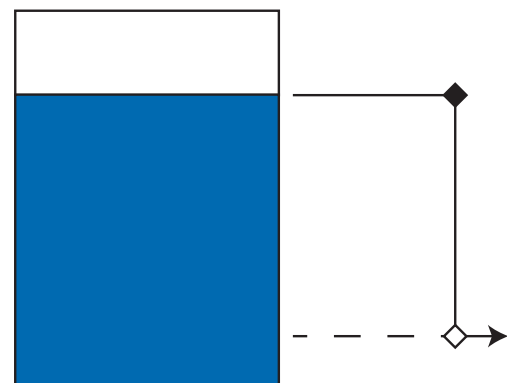
- ◇ Relay energized
- ◆ Relay de-energized



- ◇ Relay energized
- ◆ Relay de-energized
- % Batch Percentage



- ◇ Relay energized
- ◆ Relay de-energized
- % Batch Percentage



- ◇ Relay energized
- ◆ Relay de-energized

Relay Mode Settings - continued

TOT VOL – Totalizer Volume:

When resettable totalizer exceeds specified volume, relay activates and latches.

Requires Totalizer Volume Reset to deactivate relay (see Reset Total, pg. 16).

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:

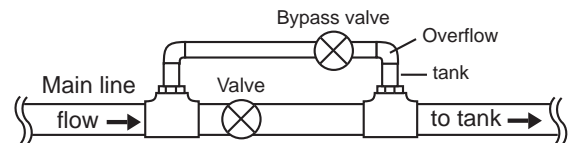
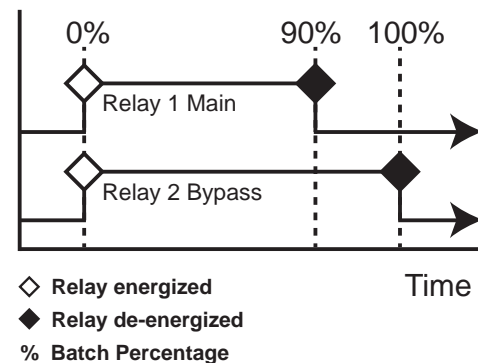
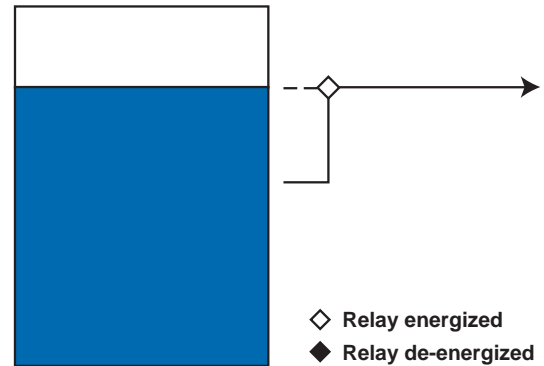
Activates relay when any one of the four enabled conditions are met. User can select from Missing Signal, Overrun, High Flow or Error.

ERROR – Error:

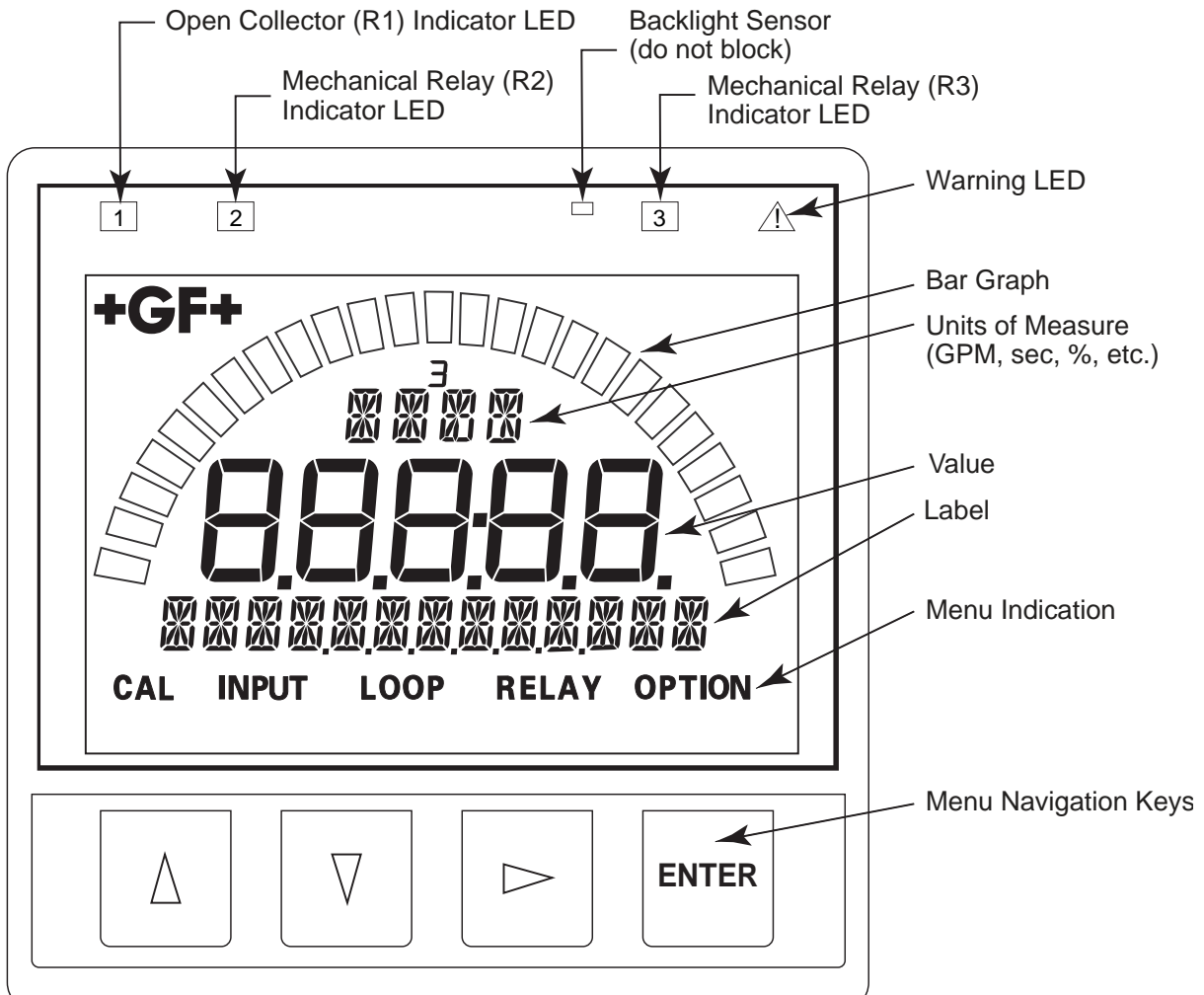
If using S³L flow sensor, activates relay when no sensor is detected.

Advanced Mode

(See Input Menu - Page 17)



Operation



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.

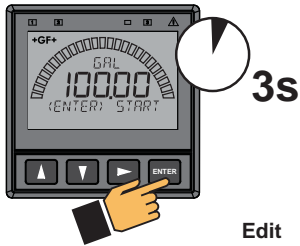
ENTER key

Access menus
Save changes.

DOWN and RIGHT keys

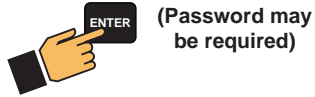
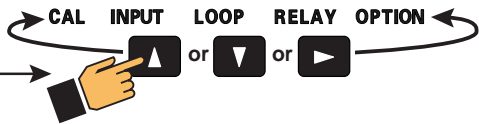
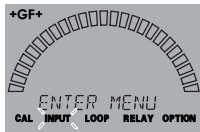
Press both together to enable manual batch or top off a previous batch. The valve will open as long as the keys remained pressed.

System Setup

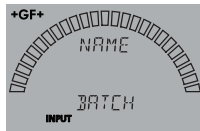


3s

Edit



Input Edit



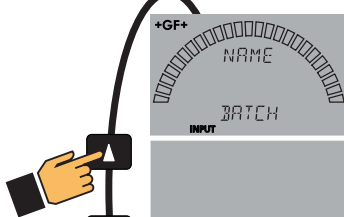
System Setup: Menu Navigation

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.
7. Press ▲+▼ again to return to normal operation.

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

Input Edit Choices

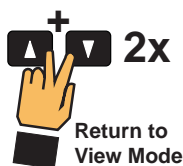


The menu is constructed in a loop, so you can move forward and backward to select an item. After any item is edited, the display will return to the selected item.

(Password may be required)



Saves Changes



Or Select another Menu Item

NOTE: Example only. Your display may be different.

Menu System



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.

This is the normal display
(when batch is running).

VIEW Mode Menu - Batch Running



Stop Running Batch Press ENTER to stop batch that is running.

Note: ENTER button stops batch in any screen on VIEW Mode.



Time Left displays estimated time remaining (in minutes) until batch is completed.



Percent Complete displays percent remaining or percent completed of running batch. Count direction based on COUNT UP/DOWN setting in INPUT menu.



Flow Rate displays current flow rate of running batch.



Output Current displays the output loop current in milliamperes (mA).



Source Volume displays the calculated remaining source volume. Shown if SOURCE VOLUME is ON.



Relay Status displays relay status for Relays 1, 2 and 3. One of three states (OFF, ON, PLS) for each relay will be displayed.

Menu System

VIEW Mode Menu - Batch Stopped



GAL
125
(ENTER) START
BATCH 1

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.



GAL
50
RESUME CANCEL

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.



GAL
325.00
(ENTER) START
OVERRIDE

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 overridden by pressing ► to edit the batch size.



GAL
00
MANUAL BATCH
(DOWN+RIGHT)

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.



GAL
15
SOURCE VOL (ENTER)

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.



NO
3000
RESET VOLUME? (ENTER)

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



GAL
00
0 12345678 (ENTER)

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.



NO
RESET TOTAL? (ENTER)

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



GAL
00
P 0 1234567 (ENTER)

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



GAL
10
OVERRUN (ENTER)

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.



4
BATCH COUNT (ENTER)

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.



NO
4
RESET COUNT? (ENTER)

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



GAL
00
BATCH (ENTER)

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

Menu System

CAL Menu

KF 600000

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.

TF 10000

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 CAL

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

Note: Relays and 4 to 20 mA output will be suspended while Volume Calibration is performed, except for relays used for Batch or Two Stage modes. Relays in pulse mode will suspend pulsing while Volume Calibration is being performed.

OVR
1.00
MANUAL COMP

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.

LAST
CAL
MM-DD-YYYY II

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

INPUT Menu

NAME

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

BATCH

SENSOR FREQ

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.

SENSOR S3L

GAL

100.00

BATCH 1

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.

GAL

BATCH UNITS

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.

TOT

Unit
GALLONS

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

GPM

FLOW UNITS

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

/S

FLOW TIMEBASE

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

OFF

BATCH CONFIRM

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

Menu System

INPUT Menu - continued

SIMPLE MODE
ADVANCED MODE

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

VOL
COUNT UP

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.

YES
MISSING SIG

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 Missing Signal Relay Mode; see page 19.

SEC
60
ON DELAY

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

TYPE
BATCH

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
COMPLETION

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

mA
20
AT COMPLETION

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.

mA
3.6
ERROR VALUE

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.

GPM
00000
4 mA SETPNT

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

GPM
10000
20 mA SETPNT

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

mA
4.00
ADJUST 4 mA

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.

mA
20.00
ADJUST 20 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.

mA
TEST LOOP

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

Menu System

RELAY Menu

R 1
NORMAL OPEN

R1 Normal Open/Closed Set Open Collector (R1) as Normally Open or Normally Closed. Default = NORMAL OPEN.

R 1
MODE OFF

Relay Mode 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.

Note: Same Relay Modes are available for Relays 2 and 3. See pg. 10-12.

R 1 TEST RELAY

Test Relay Select OFF or ON to test relay.

SHOW REMOTE

View Remote Button Status Press ► to view status of remote buttons.

1 0 0
STA STP RES

Remote Button Status Displays status of Remote Buttons: STA (Start), STP (Stop), RES (Resume). 1 = pressed, 0 = not pressed. Press ENTER to exit.

GPM
0.0000
R 1 SET FLOW

Set Flow In HI FLOW Mode, set flow value to activate relay.

GPM
0.5000
R 1 HYSTERESIS

Set Hysteresis 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.

SEC
5.0
R 1 ON DELAY

Set On Delay In HI FLOW, ERROR, and MISSING Modes, set desired ON delay. Default = 5 sec.

YES
R 1 STOP BATCH

Stop Batch? 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.

GAL
10.000
R 1 OVRUN VOL

Set Overrun Volume In OVERRUN and MULTIPLE Modes, set desired Overrun Volume.
Note: Overrun Volume must be greater than Manual Overrun Compensation, otherwise the Overrun Alarm will activate at the end of every batch.

R 1
tot
000 10000 VOL

Set Totalizer Volume In TOT VOL Mode, set desired totalizer volume.
Note: This volume is resettable and totalizer volume must be reset to clear relay. (see Resettable Totalizer, pg. 16)

GAL
10.000
R 1 VOL PULS

Set Pulse Volume In VOL PULS Mode, set desired volume.

SEC
0.1
R 1 PLS WIDTH

Set Pulse Width In VOL PULS Mode, set desired pulse width.

Menu System

RELAY Menu - continued

RELAY MULTIPLE Mode options (see discussion on page 12)

ON R1 MISSING	Missing Signal On/Off Energizes selected relay if signal is missing. Select ON or OFF.
R1 OVERRUN	Overrun On/Off Energizes selected relay if overrun occurs. Select ON or OFF.
R1 HI FLOW	Hi Flow On/Off Energizes selected relay if Hi Flow condition occurs. Select ON or OFF.
R1 ERROR	Error On/Off Energizes selected relay if an error condition occurs. Select ON or OFF.

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

R1 MODE TWO STG	Main Relay Select (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.
% 95 SETPPOINT	Setpoint Percent Select Selects the percentage of batch volume at which the main relay will be de-energized. Default = 95%.
2STG R2 BYPASS	Bypass Relay Select Selects the specified relay as the Bypass relay for two-stage valve control. This relay will remain energized while the batch is running.
R2 IN BYPASS	Relay Bypassed The specified relay is in Bypass. Note: A relay is taken out of bypass using the Bypass select screen, found under the relay which is in TWO STG Mode.

Menu System

OPTION Menu

3
CONTRAST

Contrast 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.

AUTO
BACKLIGHT

Backlight Adjust backlight level. Select OFF, LOW, HIGH or AUTO. Default = AUTO.

BATCH DECIMAL

Batch Decimal Set the decimal to the best resolution for your application. The display will automatically scale up to this resolution. Select -----, -----, ---.-- or --.---. Default = -----.

TOTAL DECIMAL

Total Decimal Set the decimal to the best resolution for the Permanent Totalizer display. The display will automatically scale up to this resolution. Select -----, -----, ---.-- or --.---. Default = -----.

YES
PWD REQUIRED

PWD REQUIRED requires password to reset TOTALIZER, BATCH OVERRIDE, SOURCE VOLUME reset, and BATCH COUNT reset. Select YES/NO. (Does not affect Permanent Totalizer.) Default = YES.

OFF
SOURCE VOLUME

Source Volume Selects SOURCE VOLUME display option. Choose ON or OFF. Default = OFF.

GAL
3000
SOURCE VOLUME

Volume Reset If SOURCE VOLUME is ON, set the reset value for the source volume. Default = 1000 GAL.

BAR
BATCH VOLUME

Bar Graph Source 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.

STD
PASSWORD TYPE

Password Type Select STD or CODE. Default = STD.

PASSWORD

Set Code If CODE is selected in PASSWORD TYPE, enter desired password code. 4-character entry not displayed, ---- displayed instead.

MEMO

Memo Enter 13-character string, if desired.

NO
REMOTE SETUP

Remote Setup 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.

9900
GENERATION II

Version Level 9900 Generation II indicates that the 9900 is Batch-capable.

Error Messages

----- NO BATCH MODULE	Remote Batch Module is missing.
----- NO SENSOR	No signal from Flow Sensor.
EXTERNAL STOP IS ACTIVE	External Stop signal is preventing batch start or Remote Stop button is held down.
CHANGE BYPASS ON 2STG RELAY	Bypass relay must be set on Bypass Relay Select option, under the Relay Menu. See page 20, under Relay Two Stage mode.
% MUST BE MORE THAN 0	Main relay shutoff percentage cannot be zero.
ERROR VOLUME TOO LOW	Volume entered during Volume Calibration is too low to calculate a K-Factor.
ERROR NEW KF OUT OF RANGE	K-Factor error during volume calibration.
VALUE MUST BE MORE THAN 0	Value cannot be zero.
1 BATCH MUST BE NONZERO	At least one batch must have a non-zero volume.
MANUAL COMP TOO HIGH	Batch size is less than or equal to Manual Compensation value.
OVR BATCH VOLUME TOO LOW	Manual overrun compensation is greater than or equal to the size of at least one of the stored batches.

Alarm Acknowledgement Messages

OVERRUN ALARM

PRESS ENTER

Overrun was detected.

HI FLOW ALARM

PRESS ENTER

High flow was detected.

ERROR ALARM

PRESS ENTER

No S³L communication or a sensor was detected.

MISSING SIG

PRESS ENTER

No flow was detected.

Calibration

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.

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.



Run
STOP (ENTER)



6
0.0000
ENTER VOLUME



KF 500000



KF 500000

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 Indicators
Update rate: "Dial-type" digital bar graph
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

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).

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.

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)	24 VDC Input; range: 10.8 to 35.2 VDC regulated 300 mA maximum
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

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)

Standards and Approvals

CE, UL, CUL

 China RoHS (visit gfsignet.com for details)

FC 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.

RoHS compliant

Manufactured under ISO 9001 for Quality,
ISO 14001 for Environmental Management and
OHSAS 18001 for Occupational Health and Safety.

Specifications

Input Specifications

Digital (S ³ L):	Serial ASCII, TTL level, 9600 bps
Frequency:	
Sensitivity:	80 mV @ 5 Hz, gradually increasing with frequency
Range:	0.5 Hz to 1500 Hz @ TTL level input for open collector
Accuracy:	± 0.5% of reading max error @ 25 °C
Resolution:	1 µs
Repeatability:	± 0.2% of reading
Power Supply	
Rejection:	No Effect ± 1 µA/V
Short Circuit	Protected
Reverse Polarity	Protected
Update Rate:	(1/frequency) + 150 ms

Output Specifications

One 4 to 20 mA output	
Current Loop Out:	ANSI-ISA 50.00.01 Class H
Span:	3.8 to 21 mA
Zero:	4.0 mA factory set; user programmable from 3.8 to 4.2 mA
Full Scale:	20.00 mA factory set; user programmable 19.0 to 21.0 mA
Accuracy:	± 32 µA max. error @ 25 °C @ 24 VDC
Resolution:	6 µA or better
Temp. Drift:	± 1 µA per °C
Pwr Sply Rejection:	± 1 µA per V
Isolation:	Low voltage (< 48 VAC/DC)
Voltage:	10.8 to 35.2 VDC
Max. Impedance:	250 Ω @ 12 VDC 500 Ω @ 18 VDC 750 Ω @ 24 VDC
Update Rate:	150 mS nominal
Short circuit and reverse polarity protected	
Adjustable span, reversible	
Error Condition:	Selectable error condition 3.6 or 22 mA or NONE
Actual update rate:	Determined by sensor type
Test Mode:	Increment to desired current (range 3.6 to 21.00 mA)
OC Outputs:	1
Analog Outputs:	1 passive
Linear scaling	

Ordering Information

9900-1BC Batch Controller System

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

Accessories

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



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