

## Signet 9900-1BC Batch Controller System



3-9900-1BC.090-1 Rev. 7 07/20 English

### Product Manual

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



Panel Mount

### 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, 258X FlowtraMag meter 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.



**CAUTION:**

In the event of a power failure, please review the batch settings before resuming a batch. Failure to do so could result in an overfill of the container.



- English
- Deutsch
- Français
- Español
- 中文



## 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](http://www.gfsignet.com)**.  
Under **Service and Support** click **Product Registration Form**
- If this is a pdf manual (digital copy), [click here](#)

## 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.

	<b>Caution / Warning / Danger</b> Indicates a potential hazard. Failure to follow all warnings may lead to equipment damage, injury, or death.
	<b>Electrocution Danger</b> Alerts user to risk of potential of injury or death via electrocution.
	<b>Electrostatic Discharge (ESD)</b> Alerts user to risk of potential damage to product by ESD.
	<b>Note / Technical Notes</b> Highlights additional information or detailed procedure.

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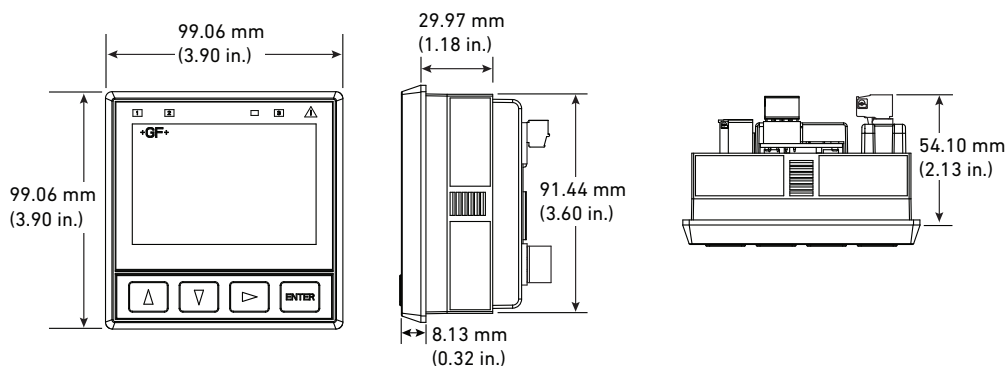
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**CAUTION:**  
Avoid Electrostatic  
Discharge (ESD)

- 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.

## Dimensions



## 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.).

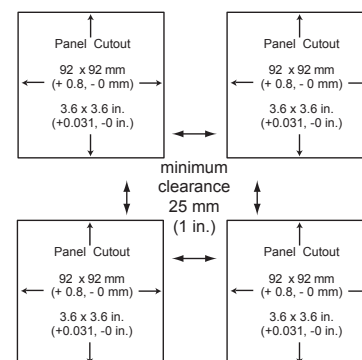
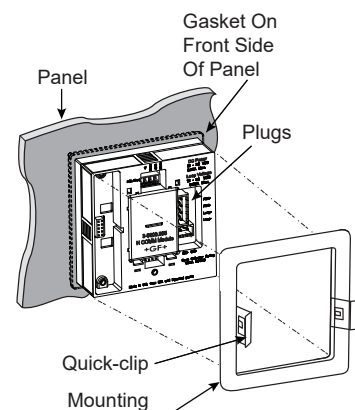
1. Place gasket on instrument, and install through ¼ DIN size opening.
2. Slide mounting bracket over back of instrument until bracket snaps into latches on sides of instrument.

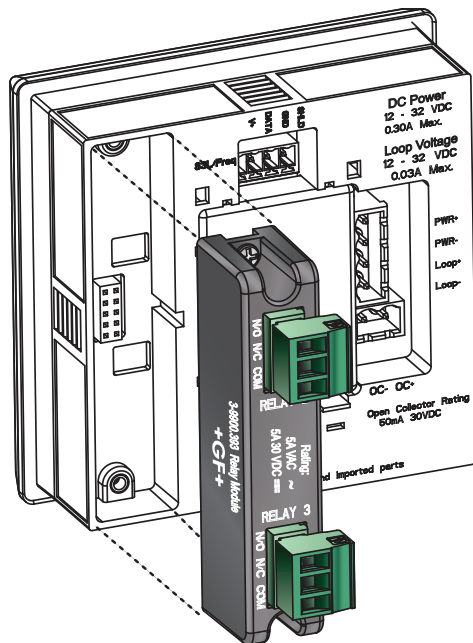
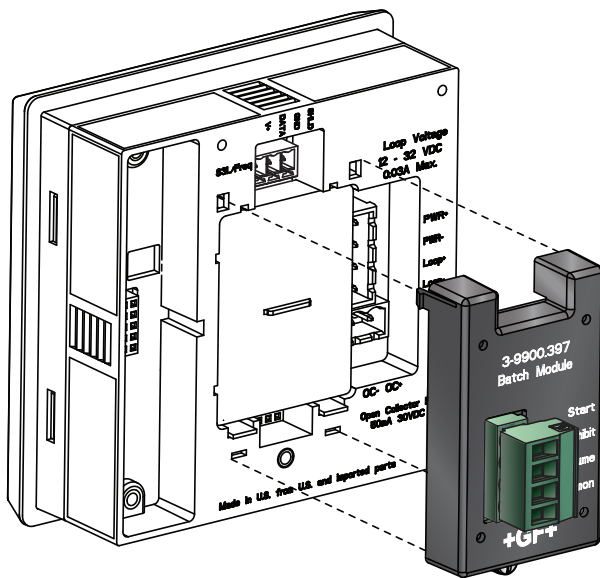
To remove:

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 (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, or with either of the Rear Enclosure Kits, 3-9900.399-1 (159 001 8340) Hinged Cover, or 3-9900.399-2 (159 001 835) Flat Cover.





- 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 or later) to a Batch Controller by plugging in a Batch Module 3-9900.397 (159 310 163).

#### 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.



**CAUTION:**  
Avoid Electrostatic Discharge (ESD)

#### 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 (159 000 617), 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

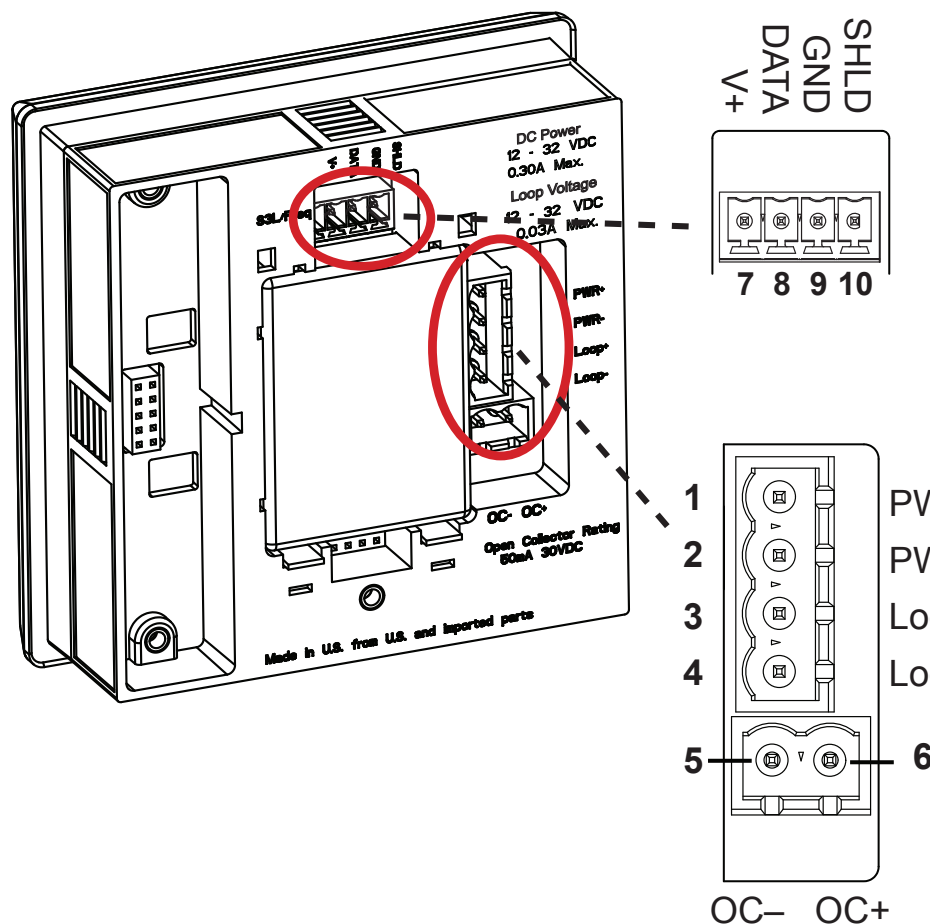
- Software selectable for Normally Open or Normally Closed

### Terminals 7-10: Digital (S<sup>3</sup>L)/Frequency Input

- For sensor 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 (S<sup>3</sup>L) / 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.

### WARNING!



Georg Fischer Signet strongly recommends against the use of 4 to 20 mA current loop controlled devices, such as actuated valves, for use as Batch control elements. On power up, the 9900 current loop will supply a 12 mA signal on the current loop output while the system initializes, if an error occurs, such as a missing Digital (S<sup>3</sup>L) sensor or overrun, the current loop will go to the error current of 3.6 or 22 mA. Improper programming of the loop completion current or the loop error current can cause unintended actuation of the current loop controlled device. These can cause an unexpected discharge of material from the batch system.

### Important



Proper operation of the batch module requires Generation II, version 25-04 software (or greater) in the 9900 Transmitter. To determine the software version of the 9900 Transmitter, please see instructions below.

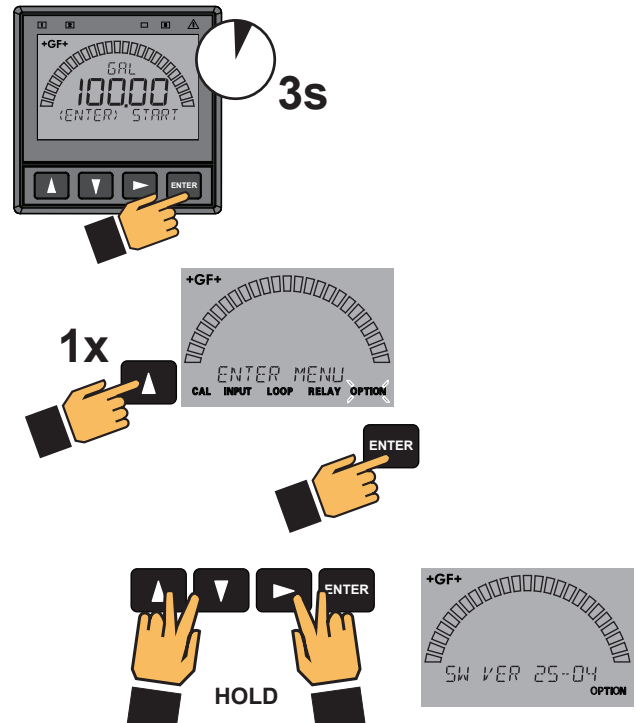
If your unit has an older version of software, please contact your local GF sales office for upgrade instructions.

#### Note:

The 9900 in Batch mode does not support the 3-9900.270-MX Modbus or the 3-9900.395 HART Communication modules. No data is available from the 9900 when configured for Batch operation.

Instructions for determining the version of the 9900:

1. Press and Hold the Enter key until the MENU screen is displayed.
2. Press the Up arrow key once, the OPTION item should be blinking.
3. Press the Enter key to navigate to the Option screen.
4. Simultaneously press and hold all four buttons (Up, Down, Right Arrows and Enter)
5. The screen will change and show "SW VER 25 – 04"
6. If the software version is less than 25-04, please contact your local GF sales office for upgrade information.



### ► **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. 8), power (pg. 9) and Open Collector and relay(s) (pg. 10).*

**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 damage to 9900 Transmitter, Relay Module, and Batch Module.

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

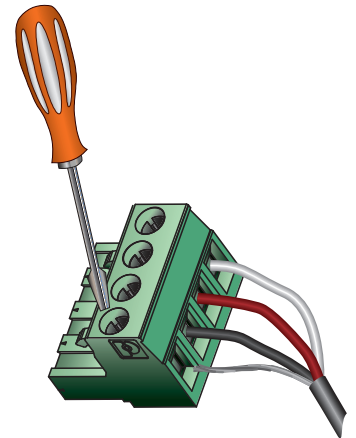
In general:

- 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.



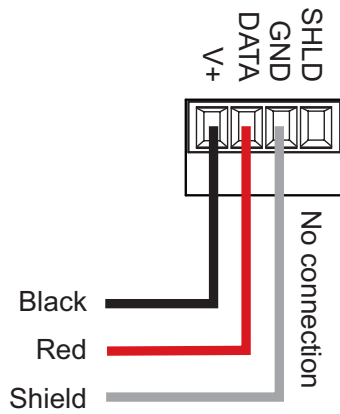
#### **Tools Required**

- Phillips screwdriver
- Flat-head screwdriver
- Wire strippers

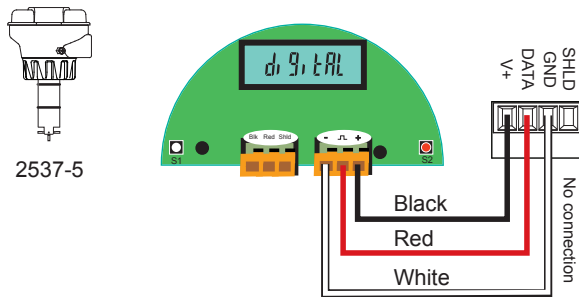


## Sensor Wiring

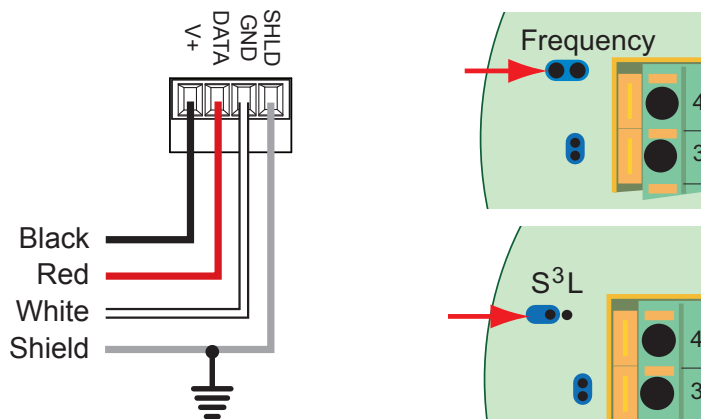
515 (8510), 525,  
2000, 2100, 2507,  
2536 (8512), 2540



2537



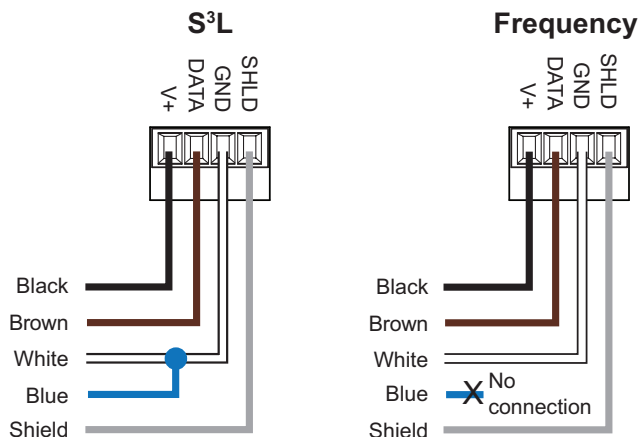
2551\*



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 (S<sup>3</sup>L) signal.

### 2551 & 2552

#### Technical Notes:

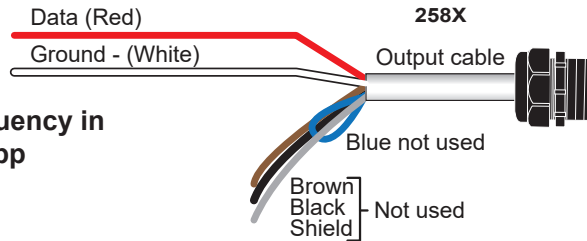
- Either Frequency or Digital (S<sup>3</sup>L) may be used.
- The frequency output will be displayed as positive flow regardless of the flow direction.
- Signet recommends configuring the 2551 with the Digital (S<sup>3</sup>L) output because it is more accurate.**
- Input sensor type is selected by choosing 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.



## Sensor Wiring

258X

**Choose Frequency in Bluetooth® App**



• When choosing **Frequency** in the Bluetooth® App, the 258X outputs an open collector frequency signal that can be connected to the 9900-1BC.

• 24 VDC power at 1 amp should always be connected.

**NOTE:** The frequency output will be displayed as positive flow regardless of the flow direction.

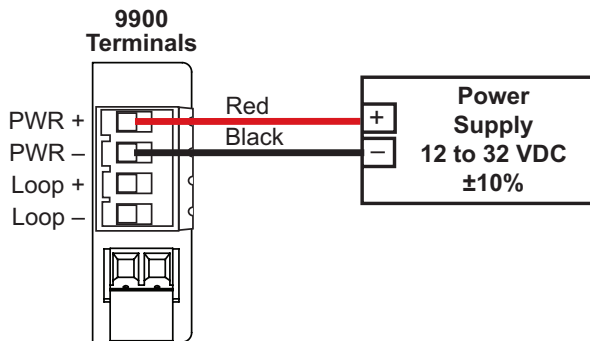
## Power Wiring



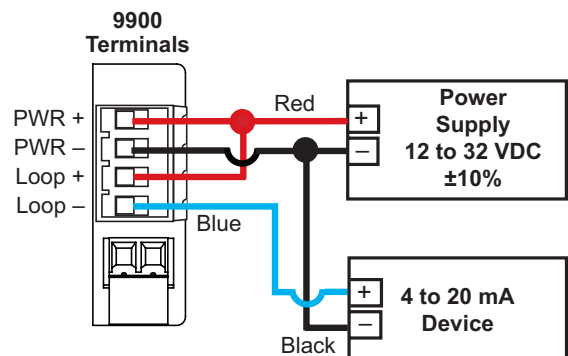
### CAUTION!

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

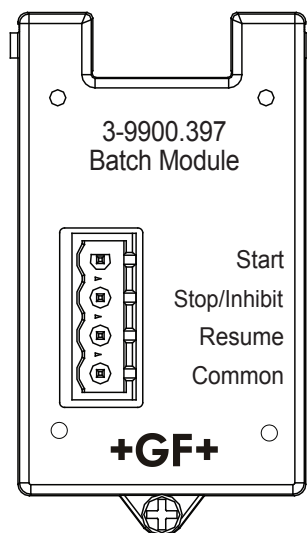
### Stand-alone application



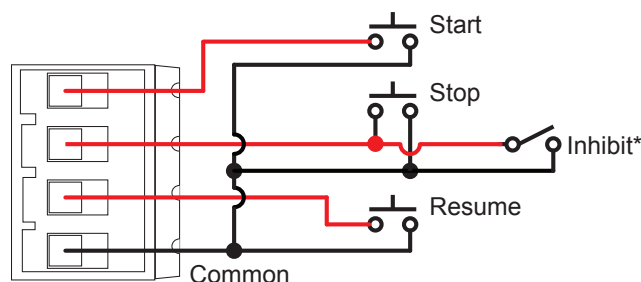
### Connection to a 4 to 20 mA device



## 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.

**Note:** The minimum remote push duration should be 0.5 seconds with a 1 second spacing between button pushes..

## 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

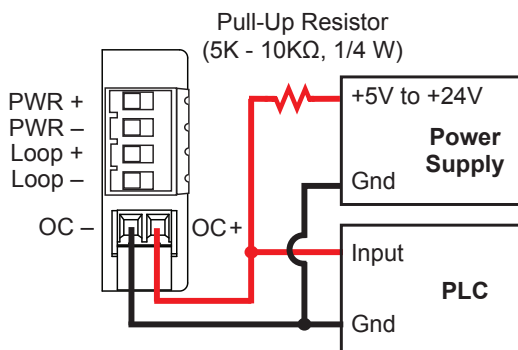
No matter the setting, the Open Collector output turns off if the 9900 loses power. This must be taken into account when evaluating system failure consequences. If the system layout requires a “closed” or “on” condition for the output in case of power loss, a mechanical dry-contact relay (NC contacts)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

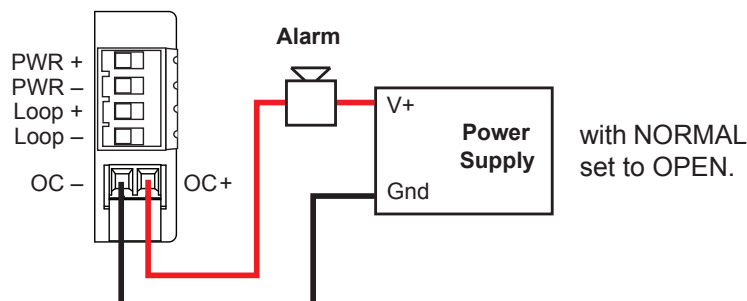
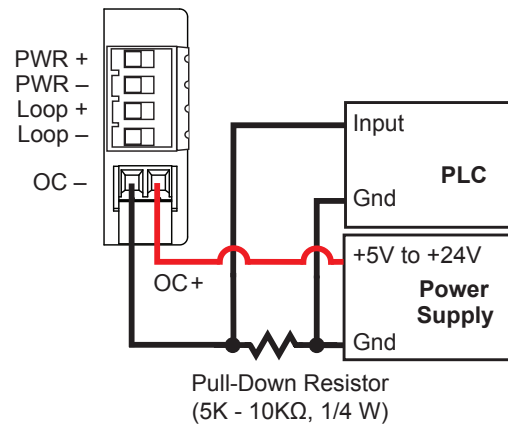
Most indicating instruments or control system inputs require a signal voltage of 0 to 5 V (TTL or CMOS logic levels) or 0 to 24 V. Therefore, the 9900 Open Collector output circuits must be equipped with a pull-up or pull-down resistor (not supplied), and a quality regulated 5 to 24 V (depending on the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

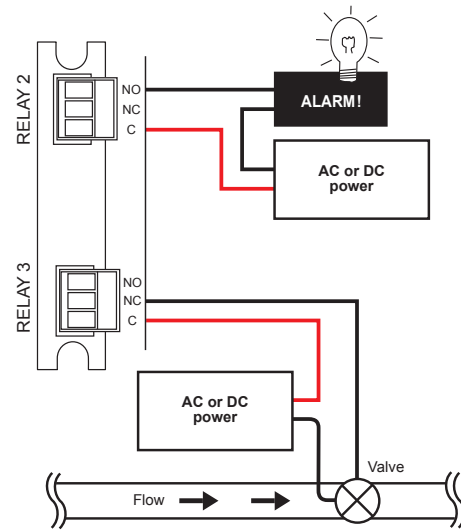


## Relay Module Wiring

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

The valve is ON during normal operation, and will go OFF 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\*:

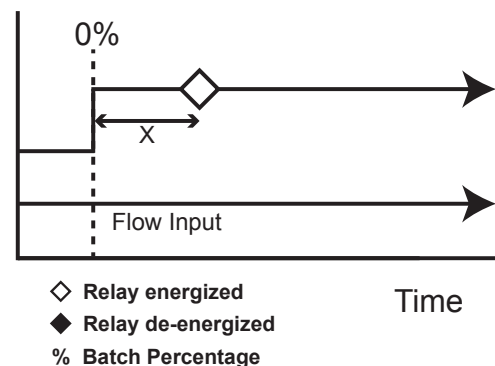
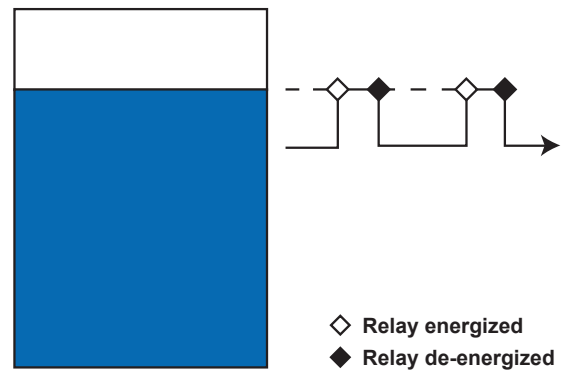
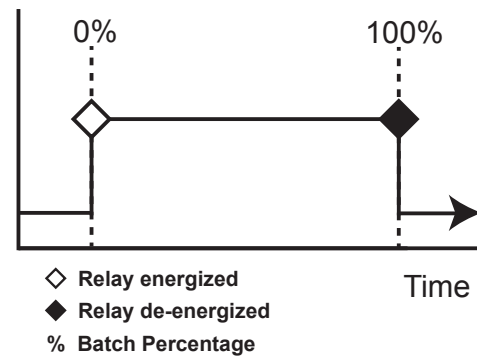
Generates a pulse each time a user defined volume is reached.

### MISSING – Missing Signal\*:

Activates relay when no flow is detected for X seconds during a batch cycle.  
(X is user defined) Default = 5 seconds.

### \*Simple Mode

(See Input Menu - Page 19)



## 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 21).

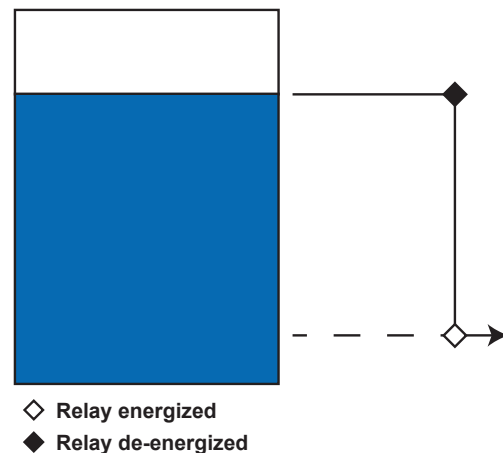
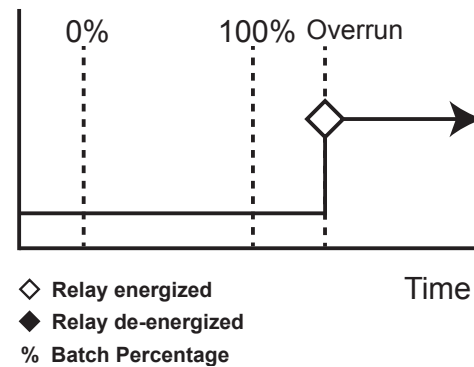
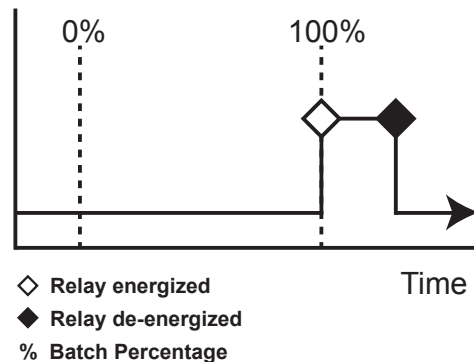
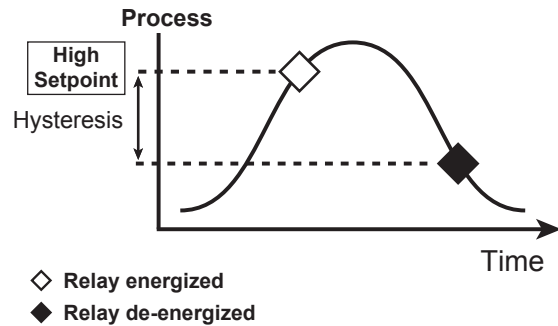
**Note:** The Overrun Alarm Volume must be greater than the Manual Compensation Volume. If the Overrun Alarm Volume is less than or equal to the Manual Compensation Volume, the Overrun Alarm will activate on every batch.

### 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 19)



## Relay Mode Settings

### 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 18).

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:

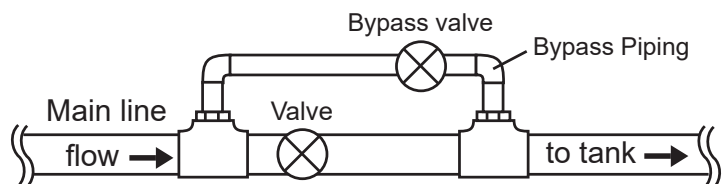
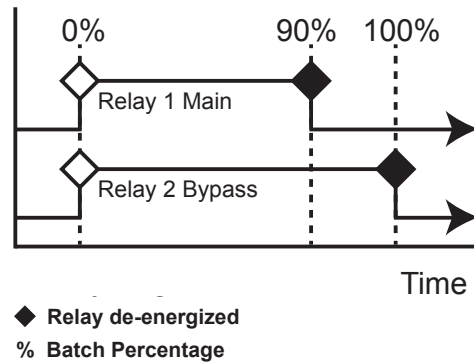
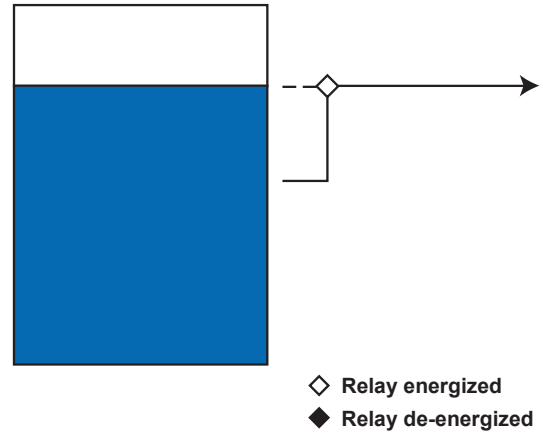
Activates relay when any one of the four enabled conditions are met. User can select from Missing Signal, Overrun, High Flow or Error.

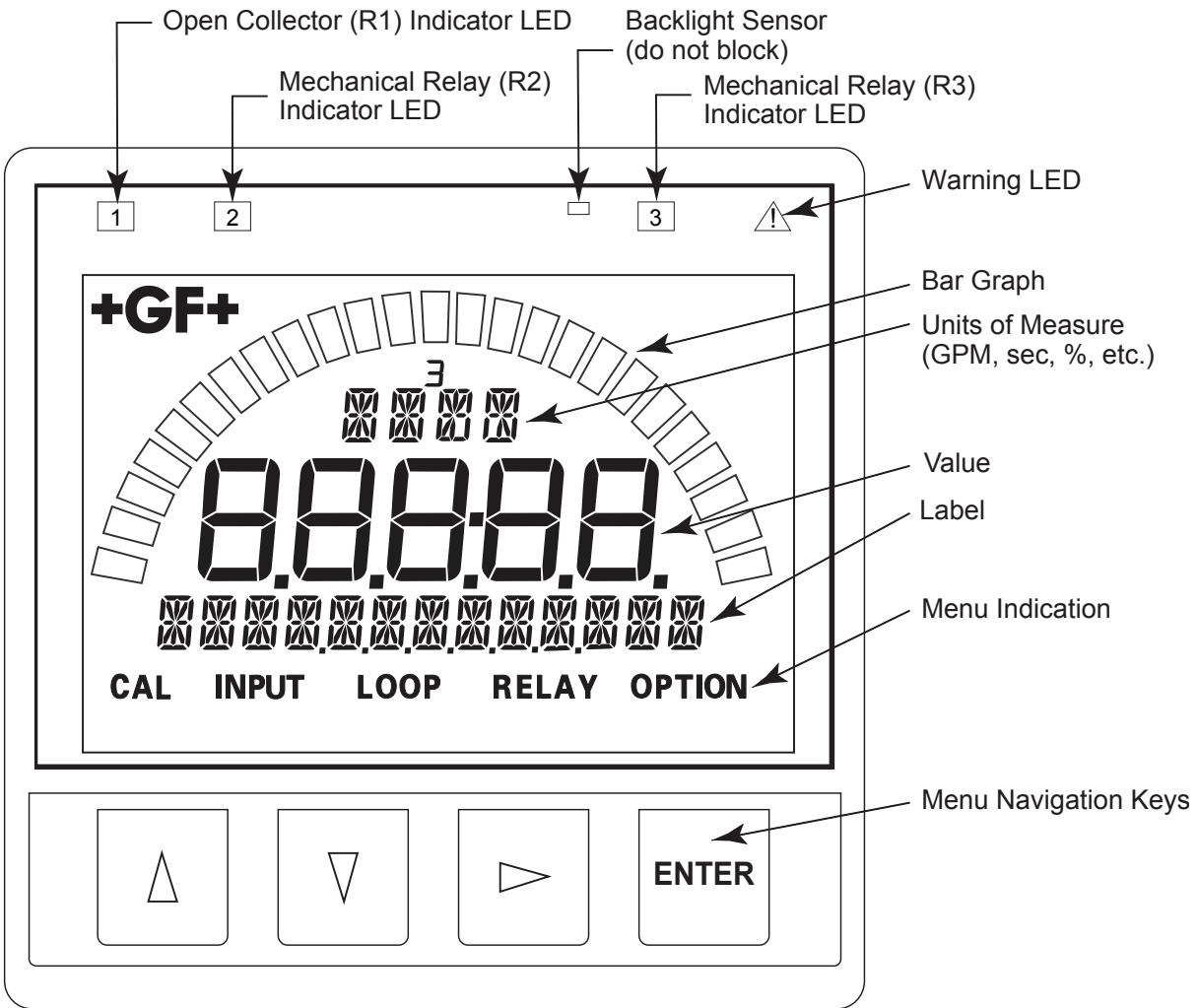
### ERROR – Error:

If using S<sup>3</sup>L flow sensor, activates relay when no sensor is detected.

### Advanced Mode

(See Input Menu - Page 19)





## 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

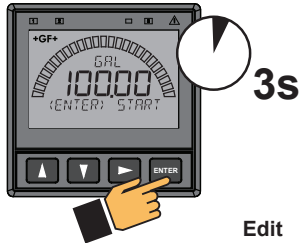
Select item or character to edit.

## ENTER key

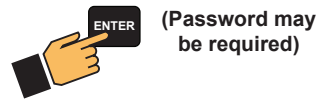
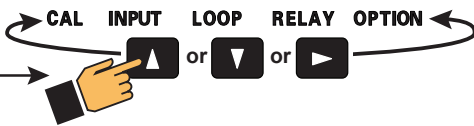
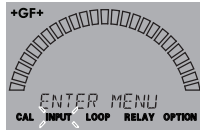
Access menus  
Save changes.

## DOWN and RIGHT keys

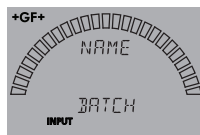
Press both together to enable manual batch or top off a previous batch. The valve will open as long as the keys remained pressed.



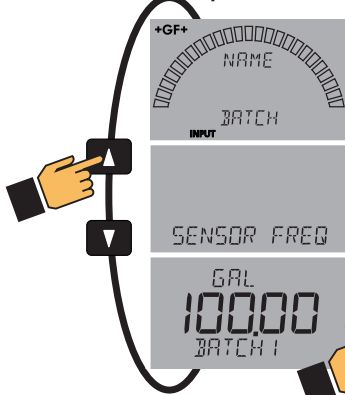
Edit



Input Edit



Input Edit Choices

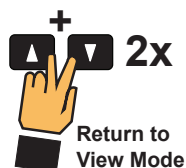


The menu is constructed in a loop, so you can move forward and backward to select an item. After any item is edited, the display will return to the selected item.

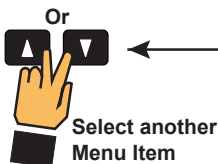
(Password may be required)



Saves Changes



Or



## 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.

**NOTE:** Example only. Your display may be different.



## Menu System

### 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 percentage of batch volume, but can display a source volume when configured 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, unless noted.
- 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.



In the MENU mode, if the wrong code or password is entered, an ERROR message is displayed.



To change your CODE, go to OPTIONS mode, enter your desired code and press ENTER. (The STD password cannot be changed.)

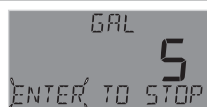


This is the normal display  
(when batch is running).

### 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 S<sup>3</sup>L) 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



**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.

## 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** In Simple mode the user can temporarily change the size of the batch. The batch returns to the programmed value at the end of the current batch run. In Advanced mode the Override can be set to permanently change the size of the batch value. A batch is overridden by pressing the ► to edit the batch size.

%  
95.1  
SETPPOINT -)

**Two Stage Set Point** Displays if Advanced mode and Two Stage relays are on. Allows the user to adjust the switch point for the Two Stage relays

GAL  
00  
MANUAL BATCH  
(DOWN+RIGHT)

**Manual Batch** is used for "topping off" a batch, after the batch has completed. The Batch Controller will open the valve as long as the user simultaneously holds down the ▼ and ► keys.

GAL  
15  
SOURCE VOL -)

**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?

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

GAL  
00  
0 12345678 -)

**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?

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

GAL  
00  
P 0 1234567 -)

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

GAL  
10  
OVERRUN

**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

**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?

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

GAL  
00  
BATCH

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

## CAL Menu

KF 600000	<b>K-Factor</b> Set K-Factor (pulses per unit volume) according to Flow Sensor manual. Min: 0.001, Max: 999999.9. 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	<b>T-Factor</b> 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	<b>Volume Calibration</b> Enter the dispensed volume so the 9900 can calculate a K-Factor. Refer to Volume Calibration section on page 24 for procedure. <b>Note:</b> Relays and 4-20 mA output will be suspended during Volume Calibration (does not apply for Relays used for Batch or Two Stage mode). Relays in pulse mode will suspend pulsing during Volume Calibration.
COMP AUTO COMP	<b>Select Overrun Compensation</b> (ADVANCED Mode only) Automatic or Manual. <b>Automatic Overrun Compensation</b> (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.
OVR 00000 MANUAL COMP	<b>Manual Overrun Compensation</b> (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. <b>Note:</b> To disable Overrun Compensation, select Manual Overrun Compensation and set value to 0.00.
LAST CAL MM-DD-YYYY II	<b>Calibration Date</b> Enter date of calibration (mm-dd-yyyy) and initials of calibrator (ii).

## INPUT Menu

NAME BATCH	<b>Customize Label</b> If desired, a custom name can be entered. Enter 13-character string. Default = BATCH.
SENSOR FREQ SENSOR S3L	<b>Freq or S<sup>3</sup>L</b> If your flow sensor is configured for frequency output, select FREQ. If configured for Digital (S <sup>3</sup> L) output (recommended), select S3L. Default = FREQ.
GAL 100.00 BATCH 1	<b>Batch Size</b> 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. <b>Important:</b> Minimum batch size is 0.001. Batch size of 0.0009 or less are treated as zero sized batches. <b>Note:</b> Same batch names can be assigned to multiple batches.
GAL BATCH UNITS	<b>Batch Units</b> 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	<b>Totalizer Units</b> Identifies the Totalizer Units. It has no effect on any calculation. Default = GALLONS.
GPM FLOW UNITS	<b>Flow Units</b> 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	<b>Flow Timebase</b> Select S (seconds), M (minutes), H (hours), or D (days). Default = M.
OFF BATCH CONFIRM	<b>Batch Confirmation</b> Select Batch Confirmation option. Choose ON, OFF, or PWD (password). Default = OFF.

## INPUT Menu

SIMPLE MODE

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

ADVANCED MODE

VOL

**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.

COUNT UP

YES

**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 22.

MISSING SIG

SEC

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

60

ON DELAY

OFF

**Save Override** Advanced Mode, the Overridden batch size volume replaces the programmed batch size if set to Yes.

SAVE OVERRIDE

TYPE

**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.

BATCH

## LOOP Menu

LOOP

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

COMPLETION

mA

20

**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.

AT COMPLETION

mA

3.6

**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.

ERROR VALUE

GPM

00000

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

4 mA SETPNT

GPM

10000

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

20 mA SETPNT

mA

4.00

**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 4 mA

mA

20.00

**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.

ADJUST 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.

## 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 pages 10-12.**

R 1 TEST RELAY

**Test Relay** Select OFF or ON to test relay.

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, MISSING, and MULTIPLE Modes, set desired ON delay. Default = 5 sec.

**Note:** If MISSING has a delay value, in the Input menu, the relay will be delayed by the combination of the Input On Delay and the Relay On Delay

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 OVERRUN 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, page 18)

GAL  
100.00  
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.

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.

## RELAY Menu

### RELAY MULTIPLE Mode options (see discussion on page 13)

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

### RELAY TWO STAGE Mode option (see discussion on page 13)

R1 MODE TWO STG	<b>Main Relay Select</b> (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.
% 95.0 SETPOINT	<b>Setpoint Percent Select</b> Selects the percentage of batch volume at which the main relay will be de-energized. Default = 95.0%.
2STG R2 BYPASS	<b>Bypass Relay Select</b> 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	<b>Relay Bypassed</b> The specified relay is in Bypass. <b>Note:</b> A relay is taken out of bypass using the Bypass select screen, found under the relay which is in TWO STG Mode.



## OPTION Menu



**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.



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



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



**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.



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



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



**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.



**Password Type** Select STD or CODE. Default = STD.



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



**Memo** Enter 13-character string, if desired.



**Remote Setup** Enables Remote Setup to configure the 9900 via a computer and the 0252 Configuration Tool. Press ► and select YES to enable. REMOTE SETUP flashes when mode is enabled. Refer to the 0252 Configuration Tool manual, 3-0252.090, included with your configuration tool.



**Version Level** Displays Transmitter Generation. Batch Module (3-9900.397) requires Generation II, or later, 9900 transmitter.

## Error Messages

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

## Alarm Acknowledgement Messages

<div>OVERRUN ALARM</div> <div>PRESS ENTER</div>	Overrun was detected.
<div>HI FLOW ALARM</div> <div>PRESS ENTER</div>	High flow was detected.
<div>ERROR ALARM</div> <div>PRESS ENTER</div>	No S <sup>3</sup> L communication or a sensor was detected.
<div>MISSING SIG</div> <div>PRESS ENTER</div>	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.
- In Advanced Mode, 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)



G  
00000  
ENTER VOLUME



KF 600000



KF 600000



## Specifications

### Standards and Approvals

CE, UL, CUL

RoHS compliant

Manufactured under ISO 9001, ISO 14001 and  
ISO 45001

 China RoHS (visit [gfsignet.com](http://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.

### Input Specifications

Digital (S<sup>3</sup>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 .....  $\pm 0.5\%$  of reading max  
error @ 25 °C

Resolution ..... 1  $\mu$ s

Repeatability .....  $\pm 0.2\%$  of reading

### Power Supply

Rejection ..... No Effect  $\pm 1 \mu$ A/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 .....  $\pm 32 \mu$ A max. error @ 25 °C  
@ 24 VDC

Resolution ..... 6  $\mu$ A or better

Temp. Drift .....  $\pm 1 \mu$ A per °C

Pwr Sply Rejection .....  $\pm 1 \mu$ A per V

Isolation ..... Low voltage (< 48 VAC/DC)

Voltage ..... 10.8 to 35.2 VDC

Max. Impedance ..... 250  $\Omega$  @ 12 VDC  
500  $\Omega$  @ 18 VDC  
750  $\Omega$  @ 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

## 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/S <sup>3</sup> L Plug, 4 Pos, In-Line
6682-3104	159 001 713	Freq/S <sup>3</sup> 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
3-8050.396	159 000 617	RC Filter Kit
3-0252	159 001 808	0252 Configuration 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.)
3-9900.399-1	159 001 834	Rear Enclosure Hinged Cover
3-9900.399-2	159 001 835	Rear Enclosure Flat Cover



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