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GF Piping Systems

+GF+



Your application, our system

The NEW Signet 9950 Dual Channel Transmitter

Setup Ease of a Transmitter with the Versatility of a Controller



9950 Dual Channel Transmitter

The 9950 SmartPro Transmitter takes a simple approach to modularity. Choose from DC powered only or AC/DC powered system. The 9950 is ready to run out of the box with its standard two 4 to 20 mA passive outputs. Add optional relay modules and binary inputs, and transform your SmartPro in to a two channel controller. With onboard clock/calendar, derived functions, and advanced relay operation, you have seemingly countless configurations to meet your process control needs.

+ Applications

- Water Treatment
- Wastewater Treatment
- Reverse Osmosis
- Deionization
- Media Filtration
- Chemical Manufacturing/Addition
- Metal Finishing
- Fume Scrubber
- Odor Control
- Cooling Tower
- Chemical Dosing/ Injection
- Aquatic Life Support
- Pools & Fountains
- Rinse Tanks
- Chemical Neutralization

Approvals

UL Pending

+ Features and benefits

- Out of the box “Easy Setup” prompts user for general settings that allows for faster system commissioning.
- True independent two channel Multi-Parameter input selection allows mix and match of frequency, (S^3L), or 4 to 20 mA to (S^3L), providing a multitude of measurement capabilities.
- Custom independent channel labeling for easy process identification.
- Sensor recognition aids in parameter identification for simple channel setup.
- Adjustable backlighting allows for clear viewing, even in the darkest areas.
- Optional relay module with 4 dry contact relays (SPDT) for a wide variety of functions including Low, High, Timer, and Proportional Pulse.
- Optional relay module with 2 dry contact (SPDT Relays) and 4 binary input (switches) means added parameter feedback in the form of flow, level, pressure etc., giving up to a total of six process inputs.
- Advanced Boolean logic allows for up to three process inputs per relay meaning more control options.
- The integrated USB port allows field upgrades so there is no need to pull the unit from service.
- The Derived Function feature allows for two like channel measurement comparisons such as Sum, Delta (difference), and Ratio to be displayed and outputted via relay or loop (4 to 20 mA).

Technical features

The 9950 includes advanced features such as derived functions, advanced multiple relay modes, and timer-based relay functions. Derived functions allows for the control of a relay or current loop with the sum, delta (difference), or ratio of two measurements, for example, delta pressure and delta temperature. The 9950 has a state-of-the-art microprocessor, dot matrix display, ¼ DIN size, NEMA 4X front face, dual power 12 to 24 VDC, or 100 to 240 VAC, calendar and clock function.



Specifications

Input Channels	Two frequency or S³L inputs	
Window	Shatter-resistant glass	
Keypad	4 buttons, injection-molded silicone rubber seal	
Display	Dot matrix, LCD	
Indicators	Two horizontal digital bar graphs, four LED relay status indicators	
Size	¼ DIN	
DC Power	-10 °C to 70 °C	14 °F to 158 °F
AC Power	-10 °C to 60 °C	14 °F to 140 °F
Storage Temp	-15 °C to 70 °C	5 °F to 158 °F
Voltage	+4.9 to 5.5 VDC @ 25 °C, regulated	
Enclosure Rating	NEMA 4X/IP65 (front face only)	

USB

- Upgrade to the latest software features and hardware options
- Requires a standard USB flash drive
- Updates available on GF website



Red Backlight

- This feature is available in the Options menu and is designed to visually alert personnel in the event of a sensor fault.

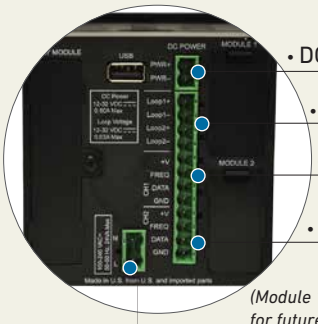


Relay Options

- 4 channel mechanical relay module
- 2 mechanical and 2 solid state relay module
- 2 mechanical relays and 4 binary inputs



Terminal Identification



- DC Power Terminals
- Current Loop Outputs
- Channel 1 Input (Frequency/S³L)
- Channel 2 Input (Frequency/S³L)

(Module 1 and Module 2 for future use)

- AC Power Terminals

Compatibility

Independent Dual Channel Multi-Parameter, Flow, pH, ORP, Conductivity, Resistivity, Pressure, Temperature, Level, Volume, Salinity, Dissolved Oxygen, Other (4 to 20 mA)



Advanced Boolean Relay Logic

Can include any combination of up to three of the following inputs: Channel 1 or 2 Primary or Secondary values, or any of the 4 (optional) binary switch inputs.

- **(A l B l C)** means "Activate this relay when any condition (A, B, or C) is true." E.g., pump protection: Turn off pump if there's a Low Flow, or High Flow, or High Temperature condition.
- **(A & B & C)** means "Activate this relay when only all conditions (A, B, and C) are true." E.g., acid neutralization (batch treat): Low pH and Hi Level, and incoming Flow, triggers actuated 3-way diverter valve to separate holding tank.

(A l (B & C)) means "Activate this relay if A is true OR if B AND C are both true." E.g., Level Control: Hi Continuous level transmitter for controlling with point level switches for alarms. Hi Binary and Hi/Hi Binary. If level transmitter is outputting Hi level OR if both point level switches are HI this activates alarm providing redundancy and safety.

- **(A & (B l C))** means "Activate this relay only if A is true AND either B or C are also true." E.g., Rinse Tank Control: Machine is on, and Lo Level, or Hi Conductivity, activates water fill valve.

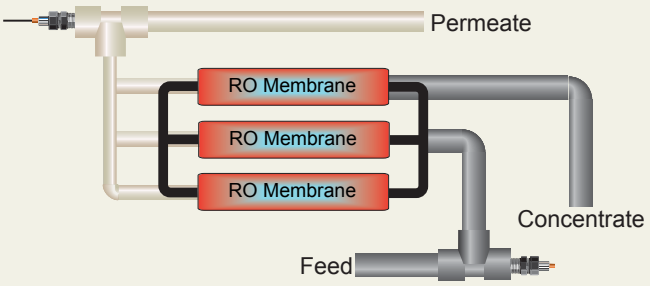
Derived Functions

When two of the same type of measurement are present, the 9950 can calculate several derived functions from like pairs of measurements.
Up to three derived Functions can be defined and used as the source for display and output functions.

- Flow, Temperature, Pressure, Conductivity and Level channels must have matching units. (Flow channels must also have same time base).
- Conductivity channels will automatically scale to µS/cm before the function calculation is made.
- Three types of derived measurements can be applied to any set of sensors, regardless of type.
  - Ratio: Measurement 1 ÷ Measurement 2 or Measurement 2 ÷ Measurement 1
  - Delta (Difference): Measurement 1 - Measurement 2 or Measurement 2 - Measurement 1
  - Sum: Measurement 1 + Measurement 2

% Passage and % Reject

- % Passage and % Reject are derived functions based on conductivity measurements only, specifically for use in reverse osmosis systems.
- % Passage is the amount of contaminates remaining in the product water compared to the level of contaminates in the feed water. For example, if the feed water measures 375 µS and the product water measures 18.75 µS, the % Passage is (18.75/375) × 100= 5%.
- % Reject is the amount of contaminates rejected to the concentrate water compared to the amount of contaminates in the feed water. For example, if the feed water measures 375 µS and the product water measures 18.75 µS the % Reject is [1-(18.75/375)] × 100 = 95%
- Decreasing Reject values and increasing Passage values usually indicate a problem with the RO membrane.

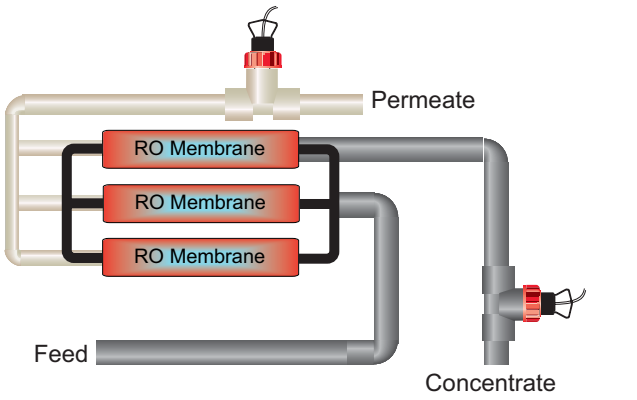


% Passage: **(Permeate ÷ Feed) × 100**

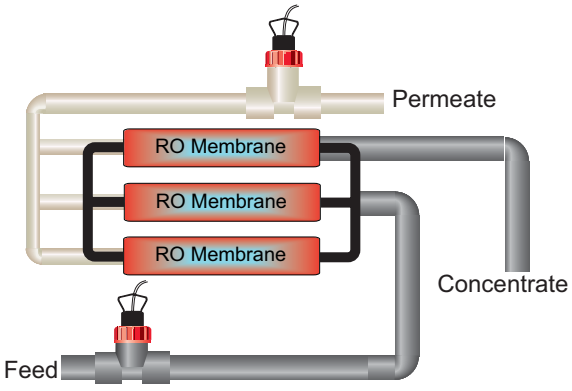
% Reject: **[1 - (Permeate ÷ Feed)] × 100**

% Recovery

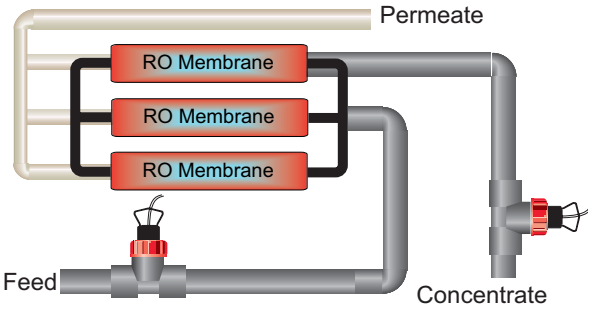
- % Recovery is a derived function based on flow rate, in a reverse osmosis system.
- To measure % Recovery, the 9950 must have two flow sensors connected. They may be located in the Feed line, the Concentrate line or the Permeate line.
- The 9950 provides 3 different methods for calculating Recovery to accommodate any configuration.
- Both flow sensors must use the same time base and units of measure.



% Recovery B: Permeate ÷ **(**Permeate **+ Concentrate) × 100**
In the Setup menu, select the option that states
% Recovery B, PERMEATE: CONC



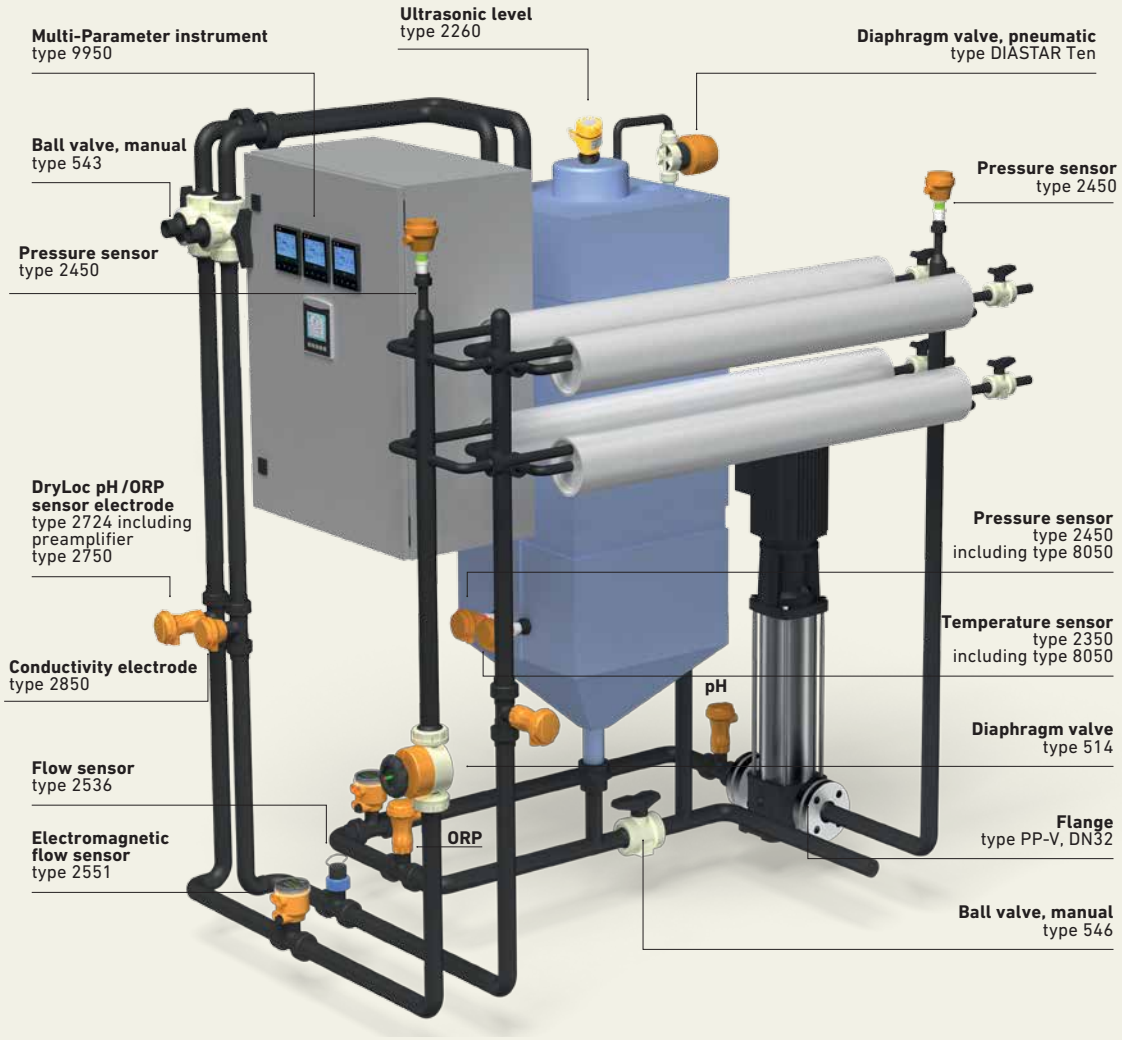
% Recovery A: **(**Permeate ÷ **Feed)** × 100
In the Setup menu, select the option that states
% Recovery A, FEED: PERMEATE



% Recovery C: **[(**Feed **- Concentrate)** ÷ Feed**] × 100**
In the Setup menu, select the option that states
% Recovery C, FEED: CONC

Applications

Reverse Osmosis



Flow

1. Influent: Monitors the total amount of water being processed through the membrane to track maintenance schedule for backwash and cleaning.
2. Permeate: Monitors the amount of permeate water from the first stage in a double RO system or the amount of water for the final process.
3. Concentrate/wastewater: Tracks the amount of concentrate or brackish water being sent to drain.

Use the Signet 9950 to monitor two flows. Derived functions provide percent recovery (A, B, or C) based on application needs.

Temperature

Temperature: Influent water temperature has a direct effect on the rejection rate of the membrane. Lower temperature reduces the ability of the membrane to reject minerals. Increased pressure is usually required to maintain product water levels.

Pressure

Pressure: Pressure across the membrane is monitored (delta P). Too much pressure across the membrane can damage the elements inside. Use of two 2450's before and after the membrane fed into a 9950 setup for derived function (Delta P) can be used to alarm and protect the membranes from over pressure damage.

pH/ORP

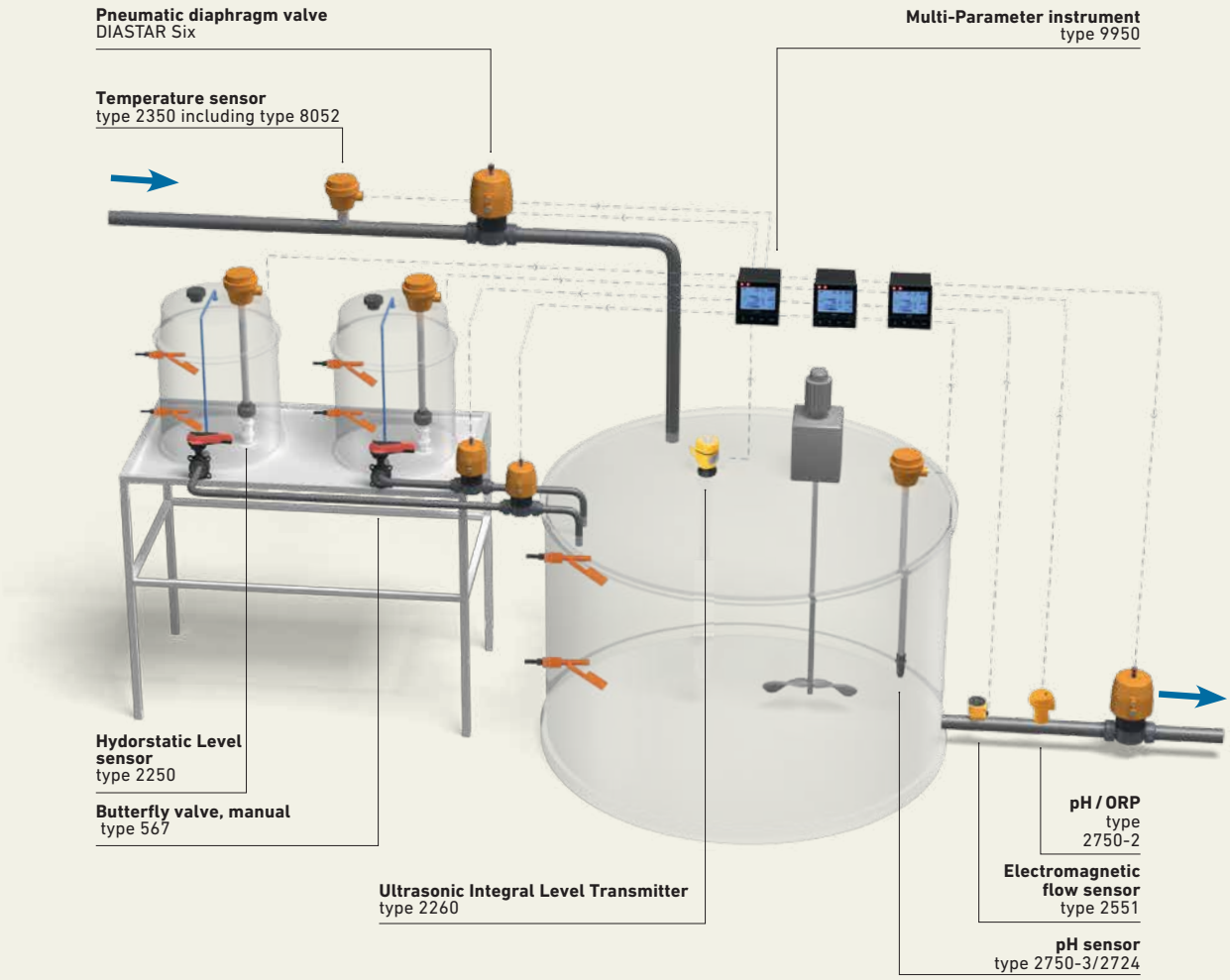
pH: Monitors pH for adjustment of incoming water membrane technology allows a wider window for process water at low pH levels. Many end users adjust pH on the front end of the RO process to reduce the amount of pH adjustment after the process is complete.
ORP: Monitors to ensure dechlorination is effective. Manufacturers of membranes require low levels of chlorine. In this case, a 9950 can be used to monitor and alarm anytime the pH or ORP values exceed the preprogrammed limits.

Conductivity/TDS

(The membrane industry usually measures water quality in TDS (total dissolved solids)).
Measuring the feed water TDS level and comparing it to the permeate TDS level allows the operator to monitor the amount of mineral rejection in the membrane. Rejection rate is an indicator of the membrane's efficiency. Foulants on the RO membrane surface can cause flux loss (permeate flow), an increase in differential pressure, higher product water conductivity, a need for increased feed pressure to maintain output or a combination of these effects.

Using the Signet 9950 to monitor Feed water and Permeate water conductivity can determine the efficiency of the RO membrane. Use of the derived function (Percent Reject) can be used to alarm/ signal the need for service based on diminished efficiency / Percent Reject.

Batch Neutralization & Effluent Monitoring



Measurements in Reverse Osmosis

Flow: In many water treatment processes, the water needs to be adapted to a pH value that complies with treatment specifications. For example, wastewater must be neutralized before it is fed into public treatment plants. Alkaline or acidic wastewater is regulated by adjusting the pH value. For alkaline neutralization, several chemicals like caustic soda are generally used direct or in combination with a neutralization of a caustic solution. Sulphuric acid, hydrochloric acid or carbonic acids are often used as acids in a batch process.

Batch Tank

Level (Continuous & point): Use of a 2260 / 2270 ultrasonic level sensor fed in to a 9950 to monitor batch treatment tank for fill and empty conditions. Add a 3-9950-3 two mechanical relay, four binary input module and add redundant level switch protection 2282's for high and low level binary inputs. All three level sensing devices can be tied into one relay through the use of the 9950's Advanced Boolean Logic function.

pH

pH: Utilizing a 2750-3 submersible pH sensor and 3-2724 pH electrode, you can tie in to the above level system. Use the two 4 to 20 mA loop outputs to proportionally drive chemical metering pumps to draw chemicals (acid or caustic) from the chemical drums.

Chemical Tank and Effluent Monitoring

Level: Use continuous level 2250 sensors into one 9950 to monitor refill requirements. Add a 3-9950-3 two mechanical relay, four binary input module and add redundant safety level switch protection 2282's for high and low level binary inputs. One controller with six points of level input.

Flow & pH: Use a 2551 magnetic flow meter for reporting purposes, and a 3-2750-X in-line sensor for effluent recording. Add a 3-9950-1 four mechanical relay module. Program one relay for window out alarm set at 6 pH -9 pH. Relay can be tied to 3-Way Georg Fischer Electrically Actuated valve for diversion of improperly treated liquid, preventing an out of compliance condition with the local authority.

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