

8900 Multi-Parameter Controller

Build the unit to suit any application requirement!



Available with 2, 4, or 6 channels and BTU

Description


The Signet 8900 Multi-Parameter Controller takes the concept of modularity to the extreme. Each 8900 is field commissioned with the users specified combination of inputs, outputs, and relays using simple-to-install modular boards into the base unit. To assemble a controller, there is a choice of two base units offered with a choice of back-lit LCD or vacuum fluorescent display. Then, continue building with a selection of plug-in modules for either two, four, or six input channels which accepts any of the Signet sensors listed below, and/or other manufacturer's sensors via a 4 to 20mA signal converter (Signet Model 8058). To complete your unit, choose a power module with universal AC line voltage or 12 to 24 VDC. If more features are needed, analog

output and relay modules are available and easily installed. Plus, the 8900 will support up to four additional relays via an external relay module.

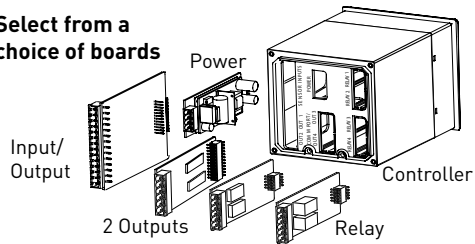
There are other notable features that the 8900 offers. For instance, digital input to the 8900 enables longer cable runs and simplified wiring with minimal noise interference. Advanced relays provide "and/or" logic to produce hi/low alarms. Derived measurements include difference, sum, ratio, percent recovery, percent rejection, percent passage - and now with BTU. The menu system can be programmed to display in multi-languages including English, German, French, Spanish, Italian, and Portuguese.

System Overview

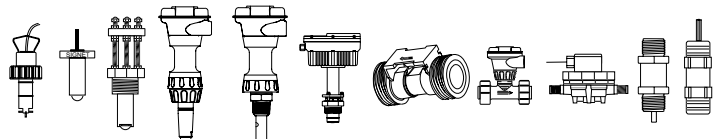
Panel Mount
Signet 8900 Multi-Parameter Controller



Select from a choice of boards

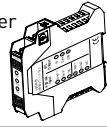


Signet Sensors (sold separately)
Use up to 6 inputs with one instrument from a choice of sensors*



*For frequency flow sensors, only two of the six inputs may be used.

Signet 8058 Signal converter



Other manufacturer's sensor with 4 to 20 mA output

Signet Fittings (sold separately). See individual sensor data sheets

Features

- Measures Flow, pH, ORP, Conductivity, Pressure, Level and Temperature
- Accepts 4 to 20mA output devices when used with 8058 signal converter
- Multi-language display
- 1/4 DIN enclosure
- Up to 4 analog outputs
- Up to 8 relays
- 12 to 24 VDC or 85 to 264 VAC Power
- Digital Communication for improved noise tolerance, extended cable lengths, and easy wiring
- Two BTU Calculations

Applications

- RO/DI System Control
- Media Filtration
- Pure Water Production
- Demineralizers
- Chemical Processing
- Metal & Plastics Finishing
- Fume Scrubbers
- General Heat Transfer System
- HVAC
- Proportional Chemical Addition
- Cooling Tower & Boiler Protection
- Wastewater Treatment
- Aquatic Animal Life Support Systems



Compatible Inputs

The 8900 Multi-Parameter Controllers are compatible with the following Signet sensors/inputs:

515	2507	2750
525	2517	2850
2000	2536	7000
2100	2540	8058
2350	2550	
2450	2551	

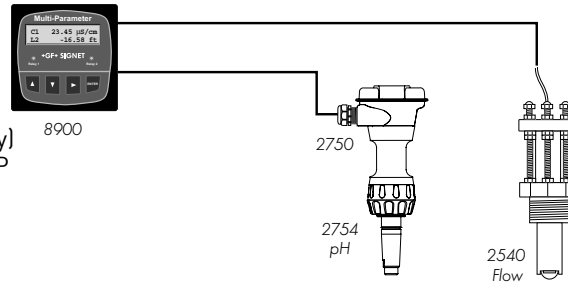
System Overview (continued)

There are hundreds of system types that can be set up with the 8900. The examples below illustrate various sensors in different installation schemes. Wiring topology for point-to-point, daisy-chain, multi-drop, or a

combination of these are listed in each example. Digital sensor outputs allow for long cable runs with high noise immunity.

Example 1:

- 8900 input module: Two inputs
- Sensors connected: Signet 2540 flow (frequency) and 2750 with 2754 pH/ORP sensors
- Wiring configuration: Point-to-point

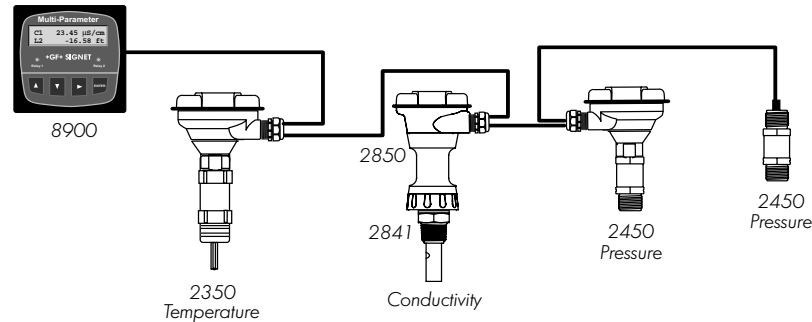


Notes:

1. External relays can be used with any input module and does not consume a sensor input channel (Model 8059)
2. Model 8058 Signal Converter can be used with any input module.

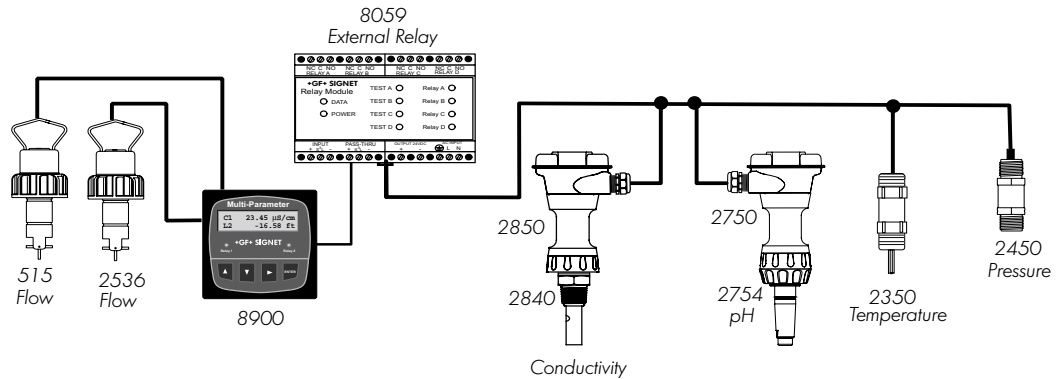
Example 2:

- 8900 input module: Four inputs
- Sensors connected: Signet 2350 temperature sensor, 2850 with 2841 conductivity, and two 2450 pressure sensors
- Wiring configuration: Daisy-chain



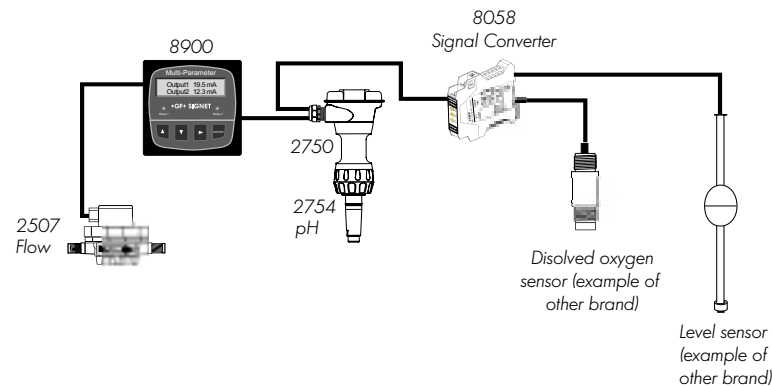
Example 3:

- 8900 input module: Six inputs
- Sensors connected: Signet 2350 temp. sensor, 2850 with 2840 conductivity, 2450 pressure, 2750 with 2754 pH, and 515 and 2536 flow (frequency) sensors
- External Devices: Signet 8059 external relay module
- Wiring configuration: Combination of Point-to-point and Multi-drop



Example 4:

- 8900 input module: Four inputs
- Sensors connected: Signet 2507 flow (frequency) and 2750 with 2754 pH sensors; Other manufacturers dissolved oxygen and level sensors with 4 to 20 mA output
- External Devices: Signet 8058 signal converter - 4 to 20 mA to digital (S³L)
- Wiring configuration: Combination of Point-to-point and Daisy-chain



Wiring Options:

- **Point-to-point** wiring is direct wiring of individual devices into the controller. This wiring topology is applicable for all inputs.
- **Daisy-chain** wiring allows sequential connection from one device to the next by using junction boxes. This wiring topology is applicable for digital (S³L) inputs only.
- **Multi-drop** wiring allows drops from a single bus cable. Junction boxes can be used for the 3-way junctions that are formed with this wiring scheme. This wiring topology is applicable for digital (S³L) inputs only.

Specifications

General

Configurability: Modular (completely field-commissionable)

No. of input channels: 2, 4, or 6

Compatible sensors: See Page 1

Input signal types:

- Digital (S³L): Serial ASCII, TTL level 9600 bps
- Frequency: 0 to 1500 Hz
- Accuracy: 0.5% of reading

Measurement types:

Flow, pH, ORP, Conductivity/Resistivity, Pressure, Temperature, Level, or any device with 4 to 20mA output

Derived measurements:

Sum, Difference, Ratio, % Recovery, % Reject, % Passage, Power 2, Power 4

No. of relays supported:

Available in pairs: 0, 2, 4, 6 or 8 (Dry-Contact and/or Solid State)

No. of analog outputs:

Available in pairs: 0, 2 or 4 (active and/or passive 4 to 20mA; and/or 0 to 5/10 VDC)

Enclosure and Display

Enclosure Rating:

NEMA 4X/IP65 (front face only)

Case material: PBT

Panel Gasket: Silicone Sponge

Window:

Self-healing polyurethane-coated polycarbonate

Keypad:

4-buttons, highly tactile and audible
Injection-molded silicone rubber seal

Display:

Alphanumeric 2 x 16 back-lit LCD or Vacuum Fluorescent (VF) versions

Update rate: 1 second

Accuracy: Sensor dependent

VF Brightness: 4 intensity levels

LCD Contrast: 4 settings

Languages Available:

English, French, Spanish, German
Italian, and Portuguese

Display ranges (see sensor specifications for actual measurement limits):

- pH: -2.00 to 15.00 pH
- pH Temp.: -40°C to 150°C (-40°F to 302°F)
- ORP: -9999 to +9999 mV
- Flow rate: 0.0000 to 999999 units per second, minute, hour or day
- Power (Power 2, Power 4): 0.0000 to 999999 units W, KW, BTU/m, BTU/h, KBTU/h, J/S
- Totalizer: 0.00 to 99999999 units
- Heating & Cooling Totalizer: 0.00 to 99999999 units J, GJ, KJ, MJ, KWh, BTU, KBTU, MBTU, MWh
- Conductivity: 0.0000 to 999990 µS, mS, PPM & PPB (TDS), kΩ, MΩ
- Cond. Temp.: -99.9°C to 250°C (-148°F to 482°F)

Display ranges (continued)

- Temperature: -99.9°C to 999.9°C (-148°F to 999.9°F)
- Pressure: -99.99 to 9999 psi, kPa, bar
- Level: -99999 to 99999 m, cm, ft, in., %
- Volume: -99999 to 999999 m³, ft³, in³, cm³, gal, L, kg, lb, %
- Other (4 to 20mA): -99999 to 99999 user selectable units

Environmental

Ambient Operating Temperature:

- Back-lit LCD: -10°C to 55°C (14°F to 131°F)
- VF Display: -10°C to 50°C (14°F to 122°F)

Storage Temp.:

-15°C to 80°C (5°F to 176°F)

Relative Humidity:

0 to 95%, non-condensing

Maximum Altitude:

- 2,000m (6,560 ft.)
- 4,000m (13,123 ft.); use only DC power supply and, if applicable, solid state relays to maintain UL safety standard up to this altitude .

Electrical

Power Requirements (AC or DC via Power Modules)

- Universal AC: 85 to 264 VAC, 50-60 Hz, 24 VA max.
- DC: 9.9 to 26.4 VDC unregulated, 7 Watts max.

Output Power to Sensors:

5VDC up to 40mA total

Terminal type:

Screw-clamp, removable via plug-in modules.

Analog Outputs (via I/O Modules and Output Modules)

All analog outputs are freely assignable to any channel

4 to 20mA Output:

Endpoints are adjustable and reversible:

- Minimum default 4.0 mA; user adjustable from 3.8 to 5.0 mA
- Maximum default 20.00 mA; user adjustable from 19.0 to 21.0 mA

Test mode:

Produces an adjustable 4 to 20mA signal for functional verification of each output circuit

Isolation: Up to 48 V AC/DC

Error condition:

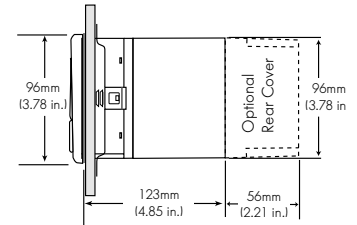
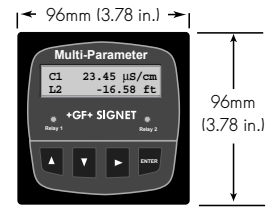
22.1 mA (default state when output source not configured)

Update rate: 100ms

Accuracy:

±32µA over entire operating temperature range

Dimensions



Specifications (continued)

Analog Outputs (Continued)

Passive 4 to 20mA

Voltage: 12 to 24VDC \pm 10%

Max. Impedance:

250 Ω @ 12 VDC

500 Ω @ 18 VDC

750 Ω @ 24 VDC

Active 4 to 20mA

Max. Impedance: 650 Ω

0 to 5/10 VDC Output:

Output range:

0 to 5 VDC or 0 to 10 VDC, software selectable

Endpoints are adjustable and reversible:

- Minimum default: 0 VDC; user programmable from 0 to 0.5 VDC
- Maximum default: 5 VDC; user programmable from 4.5 to 5.5 VDC, or 9.5 to 10.5 VDC

Output load: 10k Ω minimum

Test mode:

Produces an adjustable signal for functional verification of each output circuit

Isolation: Up to 48 V AC/DC

Error condition:

0 VDC (default state when output source not configured)

Update rate: 100mS

Accuracy:

\pm 20mV over entire operating temperature range

Resolution: 5mV

Power Supply Rejection: 0.5 mV/V

Relay Modules

All relays are freely assignable to any channel.

Internal relay modes of operation:

Off, Low, High, Window, Pulse, PWM, USP, Totalizer Volume, Advanced

External relay modes of operation:

Off, Low, High, Window, USP, Advanced

Hysteresis: User adjustable

Time Delay: 0 to 6400 seconds

Advanced relay:

"AND/OR" logic for controlling with hi/low modes.

Solid State Relays

(non-mechanical switches)

Normally open/closed operation:

Software selectable

Maximum pulse rate:

- 600 pulses/min. (volumetric pulse & PWM modes)
- 400 pulses/min. (prop. pulse mode)

Maximum voltage rating:

30 VDC or 42 VAC p-p

Current rating:

50mA DC or 50mA AC RMS

On-state impedance: 30 Ω or less

Off-state leakage: 400nA or less, AC or DC

Isolation: Up to 48 V AC/DC

Transient protection:

Embedded, up to 48 V over-voltage

Dry-contact Relays

(mechanical contacts)

Type: SPDT

Form: C

Maximum pulse rate:

- 600 pulses/min. (volumetric pulse & PWM modes)
- 400 pulses/min. (prop. pulse mode)

Maximum voltage rating:

30 VDC or 250 VAC

Current rating: 5A

Shipping Weights:

- Base unit: 1.0 kg (2.25 lb.)
- Power Module: 0.12 kg (0.25 lb.)
- I/O Module: 0.12 kg (0.25 lb.)
- Output Module: 0.12 kg (0.25 lb.)
- Relay Module: 0.12 kg (0.25 lb.)

Standards and Approvals

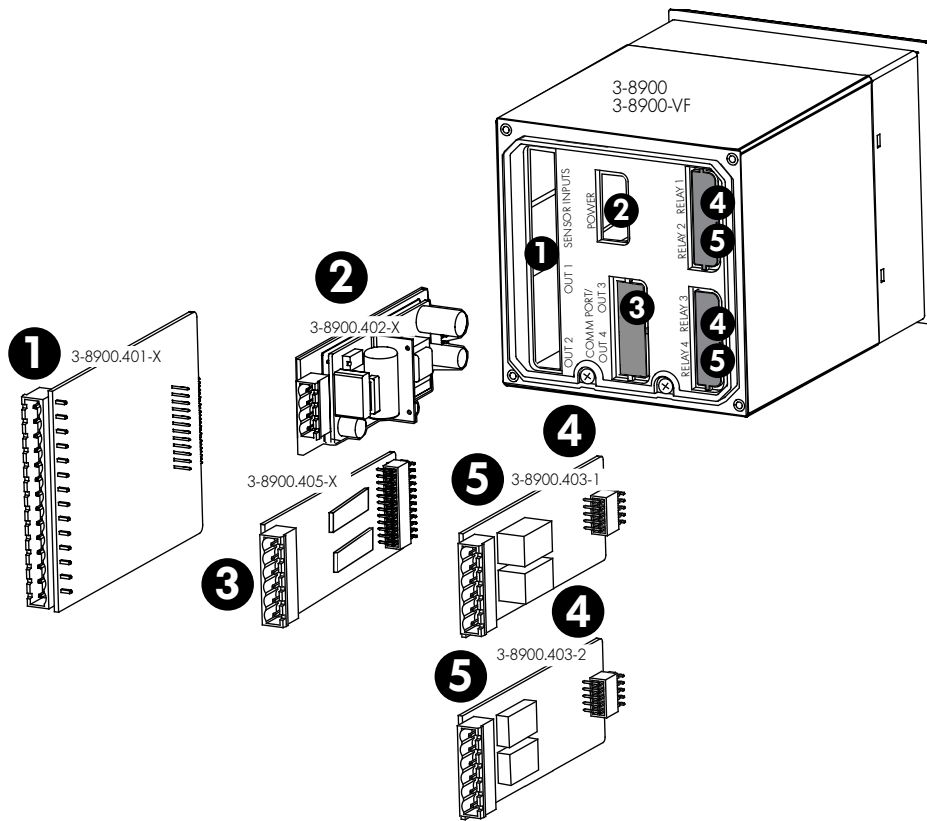
- CE, UL, and CSA
- Manufactured under ISO 9001: 2000 for Quality and ISO 14001:1996 for Environ-

Installation of Modules with the base unit

3-8900/3-8900-VF

One base unit is required to build a functional 8900. It is offered with a backlit LCD or a Vacuum Fluorescent Display and programming the unit is done simply via the push-button keypad. The unit can be tailored to display

in English, German, French, Spanish, Italian, and Portuguese. The two line display allows for easy programming, navigation, and viewing of each channel.



1. I/O module

One I/O module is required to build a functional 8900. I/O modules are offered for 2, 4, or 6 sensor inputs with or without 2 outputs. User can select two additional outputs via the output module.

2. Power module

One power module is required to build a functional 8900. The power module is offered for universal 110/220 VAC or 12 to 24 VDC (This module can be powered by optional external relays [see ordering information for more details]).

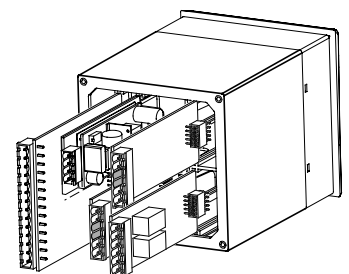
3. Output module

Output modules are optional when building an 8900. This module can be used in addition to other outputs that are available in the I/O modules. Active current and voltage outputs are powered by the 8900. Passive outputs require an outside 12 to 24 VDC power supply. All outputs are assignable to any input channel.

4 & 5. Relay modules

Relay modules are optional when building an 8900. Relay modes of operation include off, low, high, window, USP, totalizer volume, and advanced. The advanced relay option for "AND/OR" logic is used for up to 3 conditions. For instance, a relay will go to hi/low if "a" is true and "b" or "c" is false. One or two relay modules can be installed into the 8900. One additional external relay module can also be used at the same time (See optional external relay ordering information.) All relays are assignable to any input channel.

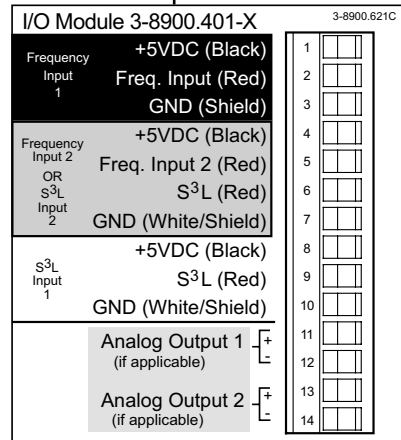
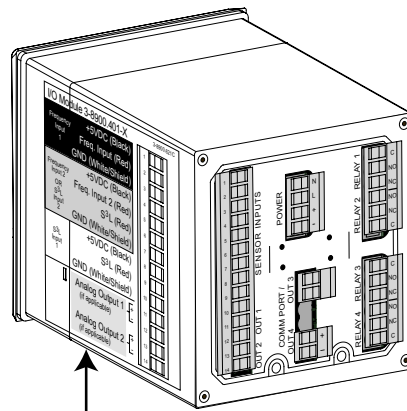
Installation of Modules:
Modules simply plug in by sliding into the base unit on rails. They are held securely in place by the rear panel. Changes and upgrades can be made in the field at any time.



Wiring

Maximum Cable Lengths for all sensors used with the 8900

The I/O Module (3-8900.401-x) supports frequency and S³L signal types. These signal types are fundamentally different from one another, and the rules governing maximum cable lengths also differ, so the two types must be treated separately. Refer to the following two sections as necessary to determine the cable length limitations of any system.



Power Connection ⚠️

100 - 240VAC ~
50-60Hz, 24VA MAX

11 - 24 VDC ---
0.7 A MAX.

CAUTION
DO NOT attempt to connect both AC and DC at the same time

Mechanical Relays
Rating:
5A 250 VAC ~
5A 30 VDC ---

Solid State Relays
Rating:
50 mA 30V ~

Signal Type: Frequency

The maximum allowable cable length for flow sensors with frequency output is dependent upon the output signal strength of the sensors themselves, and the degree to which the signals are susceptible to EMI or "noise". This is largely a function of whether the sensors are self-powered, or powered by an external source.

All of the sensors in the table below are compatible with the 8900. The three models limited to 60 m (200 ft.) are self-powered sensors. The 8900 automatically provides power to the others via the I/O Module (normal sensor wiring).

These maximum recommended cable lengths apply to individual sensors and are completely independent of one another. Additionally, these cable lengths have no relevance to any digital (S³L) devices that may also be connected to the I/O Module.

Maximum cable length	515	525	2000	2100	2507	2517	2534	2540	2541	2550	7000	7002
40 m (200 ft.)	X	X				X						
305 m (1000 ft.)			X	X	X		X	X	X	X	X	X

Signal Type: Digital (S³L)

The total maximum allowable cable length for all digital (S³L) devices in a system is primarily dependent upon the connecting instrument, not the sensors or external relays themselves. From an instrument's EMI filtering capability, and its capacity to provide power to these devices, maximum cable length guidelines can be established. For the 8900, these guidelines are defined here.

Wire Size	Total Current Consumption of S ³ L Devices					
	1 mA	2 mA	4 mA	10 mA	20 mA	40 mA
24 AWG	1800 ft	900 ft	450 ft	180 ft	90 ft	40 ft
22 AWG	2800 ft	1420 ft	710 ft	280 ft	140 ft	70 ft
20 AWG		2280 ft	1140 ft	450 ft	220 ft	110 ft
18 AWG			1810 ft	720 ft	360 ft	180 ft
16 AWG			2560 ft	1130 ft	560 ft	280 ft
14 AWG				1880 ft	920 ft	460 ft
12 AWG				2560 ft	1470 ft	730 ft

Cable capacitance <15 pft

Cable capacitance <30 pft

Cable capacitance <50 pft (practically all cables)

Wiring (continued)

In order to use this table, the total maximum current consumption of all the digital (S³L) devices in the system must be known. Refer to the current consumption table and add the appropriate mA values to find the total. Round up to the nearest column heading in the cable length table, or extrapolate

between columns to approximate the maximum allowable cable length for all S³L devices in the system (regardless of topology). Notice the influence of wire size and capacitance on maximum allowable cable lengths. Proper cable selection is imperative, especially when long runs are required in an installation.

The Maximum Current table at left applies only to digital (S³L) devices powered by the 8900 (normal sensor wiring). If an auxiliary power source more local to the sensor is used, then wire size may be reduced and S³L wiring distances may be substantially increased. Contact your local +GF+ sales office for more information.

Maximum Current Consumption for S ³ L Devices	
S ³ L Device	Current Consumption per Device
2350 Temperature Sensor	1 mA
2450 Pressure Sensor	1 mA
2750 and 2760 pH and ORP Sensors	3 mA
2850 Conductivity Sensor	2 mA
8059 External Relay Module *	1 mA
* The S ³ L communication link between the 8900 and the 8059 is powered by the 8900 and consumes 1 mA maximum. However, the 8059 External Relay Module always requires a separate power source for its operation.	

Ordering Information

To build a functional 8900 controller, choose a base unit, power module, and input/output (I/O) module. Additional outputs and relays are available, if needed.

Mfg. Part No.	Code	Description
Base units, require dc choose one		
3-8900	159 000 868	Base unit with backlit LCD
3-8900-VF	159 000 869	Base unit with Vacuum Fluorescent display
I/O (input/output) modules, require dc choose one		
3-8900A01-1	159 000 870	Dual (2) Input (no outputs)
3-8900A01-2	159 000 871	Dual (2) Input with Two Passive* Loop Outputs
3-8900A01-3	159 000 872	Dual (2) Input with Two Active Loop Outputs
3-8900A01-4	159 000 873	Dual (2) Input with Two Voltage Outputs
3-8900A01-5	159 000 874	Quad (4) Input (no outputs)
3-8900A01-6	159 000 875	Quad (4) Input with Two Passive* Loop Outputs
3-8900A01-7	159 000 876	Quad (4) Input with Two Active Loop Outputs
3-8900A01-8	159 000 877	Quad (4) Input with Two Voltage Outputs
3-8900A01-9	159 000 968	Six Inputs (no outputs)
3-8900A01-10	159 000 969	Six Inputs with Two Passive* Loop Outputs
3-8900A01-11	159 000 970	Six Inputs with Two Active Loop Outputs
3-8900A01-12	159 000 971	Six Inputs with Two Voltage Outputs
Power modules, require dc choose one		
3-8900A02-1	159 000 878	110/220 VAC Power Module
3-8900A02-2	159 000 879	12 to 24 VDC Power Module
Optional output modules - choose one		
3-8900A05-1	159 000 883	Two Passive* Current Loop Outputs
3-8900A05-2	159 000 884	Two Active Current Loop Outputs
3-8900A05-3	159 000 885	Two 0 to .5 and/or 0 to 10 VDC Outputs
Optional relay modules - choose one or two		
3-8900A03-1	159 000 880	Two Dry Contact Relays
3-8900A03-2	159 000 881	Two Solid State Relays
Optional external relays - choose one**		
3-8459-2	159 000 770	Two dry-contact relays; requires 12 to 24 VDC
3-8459-2AC	159 000 771	Two dry-contact relays; requires 100 to 240 VAC; supplies power to the 12 to 24 VDC power module
3-8459-4	159 000 772	Four dry-contact relays; requires 12 to 24 VDC
3-8459-4AC	159 000 773	Four dry-contact relays; requires 100 to 240 VAC; supplies power to the 12 to 24 VDC power module

Model 8900

Ordering Notes:

- 1) Building a functional unit requires a base unit, I/O module, and power module.
- 2) Output options are available on I/O modules and additional output modules can be used. The 8900 can support up to four outputs.
- 3) Up to two internal relay modules can be used simultaneously; additional external relays can also be used. The 8900 can support up to eight relays.
- 4) A maximum total of two frequency sensors can be used with any input card.
- 5) A total of six digit inputs or four digital with two frequency inputs can be used.
- 6) The 8900 boards can be removed or inserted at any time to add/remove inputs, outputs, and relays.
- 7) The 8900 can be reconfigured with new sensor types by simple reprogramming.

* Passive outputs require an outside power source
 ** See the data sheet for the 8059 External Relay Modules for more information.

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
Mounting		
3-8050.392	159 000 640	Panel adapter, 1/2 DIN to 1/4 DIN
3-8050.395	159 000 186	Splashproof rear cover
3-0000.596-1	159 000 892	1/4 DIN wall mount bracket, 6.5 in. (use if no rear cover is installed)
3-0000.596-2	159 000 893	1/4 DIN wall mount bracket, 9 in. (use if rear cover is installed)
3-5000.399	198 840 224	Panel adapter, 5 x 5 in. to 1/4 DIN
3-5000.598	198 840 225	Surface mount bracket
Power Supplies		
7300-7524	159 000 687	24 VDC Power Supply 7.5 W, 300mA
7300-1524	159 000 688	24 VDC Power Supply 15 W, 600mA
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
Miscellaneous		
3-8050.396	159 000 617	RC Filter kit (for relay use), 2 per kit

See Operation Manual:

- For detailed wiring information.
- For installation tips.
- For installations into panels.

For more information, contact your local George Fischer Sales Office:

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