Signet 5700 pH/ORP Monitor - ORP Instructions

3-5700.090-1 Rev. K 3/06 English/ORP

CAUTION!

Refer to instruction manual for more details.

• Remove power to unit before wiring input and output connections.

English

Follow instructions carefully to avoid personal injury.

- Contents
 - 1. Power Connections
- 2. Compatible Electrode/Preamp Wiring
- 3. 4 20 mA Current Output Connections
- 4. Relay Connections
- 5. Relay Operation

- 6. Menu Functions
- 7. Parts and Accessories
- 8. Specifications
- 9. Quick Reference Menu Parameters
- 10. Troubleshooting
- 11. Maintenance

2. Compatible Electrode/Preamp Wiring

Remove terminal blocks for easy wiring



1. Power Connections



CAUTION!

Never connect 110 VAC or 220 VAC to rear power terminals. High voltage AC will damage instrument and void warranty.





Technical Notes:

- To reduce the possibility of noise interference, isolate AC power lines from signal lines.
- Maximum 4-20 mA loop impedance (sec. 3) is affected by the supply voltage.
- Use six conductor shielded cable for cable extensions up to 120 m (400 ft) max. (#5523-0064)
- Cable shield must be maintained through cable splice.

3. 4 - 20 mA Current Output Connections

Technical Notes:

**1/8A fuse recommended (customer supplied)

* 4-20 mA output is internally powered (non-isolated), maximum loop impedance 350 Ω with a 12 V instrument supply voltage, 950 Ω with a 24 V instrument supply voltage.

To isolate output and prevent ground loop problems:

- 1. Use monitor device with isolated inputs, or
- 2. Use separate DC supply for 5700 and monitor device, or
- 3. Power 5700 with12 24 VAC step down transformer

4. Relay Connections

Two internal relay contact sets (COM, NO, and NC) may be used for external device control. Front panel LED annunciators indicate the activation status of each relay. Each relay can control up to two devices simultaneously, as shown. Relay operation modes include Low alarm, High alarm, and Proportional Pulse (sec. 5).

Common device connections include:

- Pulse mode metering pump control
- Pulse mode solenoid valve control
- Low or High mode warning lamps
- · Low or High mode bells or sirens
- Low or High mode external heavy-duty relay

Wiring Example Right

Device A **IS** powered when relay 2 is de-energized (front panel LED "off"). Power is discontinued when the relay 2 setpoint is reached (front panel LED "on"). Device B **IS NOT** powered when the relay 2 is de-energized. Power is applied after the relay 2 setpoint is reached.

5. Relay Operation





Technical Notes:

- Maximum relay contact ratings: 5 A @ 30 VDC, 5 A @ 125 VAC, or 3 A @ 250 VAC
- An external heavy-duty relay must be used for devices with surge currents or operating currents that exceed the above specifications.



C. Proportional PULSE mode

The proportional pulse relay configuration is primarily designed for metering pump control. The operator is prompted to enter a minimum and maximum ORP setpoint and maximum pulse rate for the assigned relay (sec. 6.3F, 6.3G). Relay pulse width is fixed at 130 ms. Refer to the operation examples below.

· Metering pump chemical addition (dry contact activation type required)

Example 1 (right):

As the process ORP rises above the minimum pulse setpoint (-500 mV) the relay begins pulsing; triggering the metering pump for chemical addition. As the ORP continues to rise, pulsing accelerates proportionally until the maximum programmed pulse rate of 300 pulses/minute and setpoint (+500 mV) are reached, forcing the process ORP back down to intended levels (e.g. \leq -500 mV).

Example 2 (right):

As the process ORP falls below the minimum pulse setpoint (+500 mV) the relay begins pulsing; triggering the metering pump for chemical addition. As the ORP continues to decrease, pulsing accelerates proportionally until the maximum programmed pulse rate of 300 pulses/minute and setpoint (-500 mV) are reached, forcing the process ORP back up to intended levels (e.g. \geq +500 mV).





6. Menu Functions

To access either CALIBRATE or OPTIONS menus, press and hold the ENTER key as illustrated below:



Menus:

- VIEW menu (sec. 6.1): The VIEW menu is displayed during standard operation. The operator can navigate freely through the menu by pressing either UP or DOWN arrow keys.
- CALIBRATE Menu (sec. 6.3): The CALIBRATE menu contains all critical display setup and output parameters. A simple security code feature prevents unauthorized tampering. The operator is required to enter a simple access code for menu access. The same code also unlocks OPTIONS menus.
- OPTIONS Menu (sec. 6.4): The OPTIONS menu contains setup and display features that are seldom accessed for minor display or output adjustments.
- Reversible Dial Your 5700 includes a reversible dial face for pH use. See enclosed pH manual for operation details.



6.1 VIEW Menu



See EASY CAL Procedure (Section 6.2)

Menu Displays A - G: (Factory default displays shown in menu column 1)

- A. Shows calibrated solution ORP mV and Raw (uncalibrated) input mV from ORP electrode/preamplifier
- B. Loop output display: shows the loop current output level.
- C. ORP range display: shows the programmed min and max meter range (sec. 6.3A)
- Relay 1 display: this display shows the programmed operation mode and setpoint for relay 1 (sec.
 6.3D-E)
- E. Relay 2 display: this display shows the programmed operation mode and setpoint for relay 2 (sec.
 6.3D-E)
- F. Last calibration: this display shows a user defined setup date for maintenance records. This feature is not an internal timer or calender.
- G. EASY CAL: press the right arrow key to access the EASY CAL buffer calibration procedure (sec. 6.2).

6.2 EASY CAL Procedure

Requirements

- This procedure simplifies system calibration using standard pH 4.0 and 7.0 buffers saturated with Quinhydrone (customer supplied). If standard pH 4.0 and 7.0 buffers and Quinhydrone are not available, the system can be calibrated using the CALIBRATE menu standard and slope settings (sec. 6.3B, 6.3C).
- Quinhydrone (customer supplied) is the oxidizer measured by the ORP electrode and is essential for EASY CAL calibration. To guarantee saturation with pH 4.0 and 7.0 buffers, mix 1/8 g (1/4 mL) of Quinhydrone powder for each 50 mL of pH buffer solution (sec. 7).



Technical Note:

The differences between input mV and ORP mV is a good indication of the electrode's condition. Differences in excess of 50 mV may indicate a need to service the electrode. Refer to electrode manual for maintenance recommendations.

Th	eo	reti	cal	mV	value	s

pH @ 25 °C	mV
2	+296
3	+237
4	+177
5	+118
6	+59
7	0
8	- 59
9	- 118
10	- 177
11	- 237
12	- 296

6.3 CALIBRATE Menu

Requirements

System calibration is possible with two known ORP solutions within -1000 mV - +2000 mV. The EASY CAL procedure (sec. 6.2) is recommended when standard pH buffers and Quinhydrone are available. If EASY CAL is performed, manual calibration steps B-C below are not required and should be skipped.



Menu Settings A - H: (Factory default displays shown in

menu column 1)

- A. Sets Min → Max meter dial range, -1000 mV - +2000 mV (factory installed dial, -1000 mV -+1000 mV). Contact factory for custom dial configurations. Does not effect 4 to 20 mA output
- B. Sets electrode standard to any value from -1000 mV to +2000 mV (standard value must be ≥120 mV from slope value, step C)
- C. Sets electrode slope to any value from -1000 mV to +2000 mV (slope value must be ≥120 mV from standard value, step B)

Menu items D-G repeat for relay 2 setup.

- D. Sets relay operation mode Low or High, and ORP (mV) setpoint, -1000 mV - +2000 mV (sec. 5A-B)
- E. Sets relay hysteresis, 00000 -02000 mV. Set to zero to disable feature (sec. 5A-B)
- F. Sets relay minimum and maximum pulse setpoint, -1000 mV - +2000 mV (sec. 5C)
- G. Sets relay pulse rate, 000 300 pulses/minute.
- H. Sets user defined setup date for maintenance records. This feature is not an internal timer or calender

Quick Reference Calibration Procedures:

2-Point Quick Calibration (recommended):

- 1. Set solution standard (step B)
- 2. Set solution slope (step C)

1-Point Calibration (optional): 1. Set solution standard (step B)

6.4 **OPTIONS Menu**



Menu Settings A - E: (Factory default displays shown in

- menu column 1)
- A. Selects display contrast: 5 levels
- B. Sets 4 mA setpoint: -1000 -+2000 mV. 4 mA and 20 mA setpoints are reversible
- C. Sets 20 mA setpoint: -1000 -+2000 mV. 20 mA and 4 mA setpoints are reversible
- D. Adjusts 4 mA output: 3.0 to 5.0 mA (overrides factory 4.00 mA calibration)
- E. Adjusts 20 mA output: 19 to 21 mA (overrides factory 20.00 mA calibration)

7. Parts and Accessories



Splashproof rear cover #3-5000.395 (code 198 840 227)



5 x 5 inch adapter plate for Signet retrofit #3-5000.399 (code 198 840 224)

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Optional surface mount bracket #3-5000.598 (code 198 840 225)

- Power supply, 120 VAC 24 VAC, #3-5000.075
- pH buffer kit, pH 4.0, 7.0, 10.0, #3-0700.390 (code 198 864 403)
- Front snap-on bezel, #3-5000.525 (code 198 840 226)
- 5700 pH/ORP instruction sheet, #3-5700.090-1 (code 198 869 915)

8. Specifications

General

Compatible sensors:	Signet 3-2720 pH/ORP Preamplifier/
	Sensor System
A	0.00/ - f.f. II I-

Accuracy:

±0.2% of full scale

Input range: • ORP:

-1000 to +2000 mV, optically isolated (standard -1000 to +1000 mV dial included)

Enclosure:

- Rating: NEMA 4X/IP65 front
- Dimensions: 1/4 DIN, 96 x 96 x 88 mm (3.8 x 3.8 x 3.5 in.)
- · Case: ABS plastic
- · Keypad: Sealed 4-key silicone rubber
- Weight: Approximately 500 g (18 oz.)

Display:

- Type: Microprocessor controlled air-core meter movement and backlit Alpha-numeric 2 x 16 LCD
- Update rate: <1s
- · Contrast: User selected
- Relay annunciators: 2 LEDs

Electrical

Power requirements:

 12 to 24 VDC or 12 to 24 VAC, unregulated, 50-60 Hz, 10 W max.

Relay contacts (2 sets):

- · Mechanical SPDT contacts
- Max. voltage rating: 5 A @ 30 VDC, 5 A @ 125 VAC, or 3 A @ 250 VAC, (power factor = 1.0)
- · Hysteresis: User adjustable

Current output:

- 4 to 20 mA, non-isolated, internally powered, fully adjustable and reversible
- Update rate: <1s
- Max loop impedance: 350 Ω with a 12 V instrument supply voltage, 950 Ω with a 24 V instrument supply voltage
- Accuracy: ±0.1% of max. range

Noise immunity:	EN50082-2
Noise emissions:	EN55011
Safety:	EN61010-1

Environmental

Operating temp.: -10 to 55 °C (14 to 131 °F), 50 °C (122 °F) with optional rear cover -15 to 80 °C (5 to 176 °F) Storage temp.: Relative humidity: 0 to 95%, non-condensing Altitude: 4000 m max. Pollution degree: 2

Agency Approvals

- · CE, UL listed
- Manufactured under ISO 9001

Dimensions







9. Quick Reference Menu Parameters

9.1 VIEW Menu Setup Parameters (sec. 6.1)

Menu		Display	Range	Factory
Parameters		Description		Default
A. ORP: +87 mV		ORP mV Raw sensor mV	• -1000 mV - +2000 mV	n/a
Input: +84 mV			• -1000 mV - +2000 mV	n/a
в.	Loop Output: 12.69 mA	Current loop output	3 - 21 mA	n/a
C.	Min→Max: mV −1000 → +1000	$\begin{array}{l} Min \to Max \ meter \\ and \ dial \ range \end{array}$	-1000 mV - +2000 mV	-1000 mV - +1000 mV
D.	Relay 1: Low	• Relay 1 mode	Low, High, or Pulse,	Low
	-500 mV	• Relay 1 setpoint	-1000 - +2000 mV	-500 mV
E.	Relay 2: High	• Relay 2 mode	Low, High, or Pulse,	High
	+500 mV	• Relay 2 setpoint	-1000 - +2000 mV	+500 mV
F.	Last CAL: 01-01-98	Last calibration date	00 - 00 - 00 - 39 - 39 - 99	01 - 01 - 98
G.	EASY CAL: >	EASY CAL procedure	Two pH buffers saturated with Quinhydrone required: pH 4= +87 mV, pH 7= +264 mV, (sec. 6.2)	n/a

9.2 CALIBRATE Menu Setup Parameters (sec. 6.3)

	Menu Parameters	Display Description	Range	Factory Default
Α.	Min→Max: mV −1000 → +i000 >	Min → max meter/dial range	-1000 - +2000 mV	-1000 - +1000 mV
в.	Set Standard: >	Manual electrode standard calibration	-1000 - +2000 mV	n/a
C.	Set Slope:	Manual electrode slope calibration	-1000 - +2000 mV	n/a
D.	Relay 1: Low −500 mU>	• Relay 1 mode • Relay 1 setpoint	Low or High -1000 - +2000 mV	Low -500 mV
E.	Relay 1 Hys: 10 mV>	Relay 1 hysteresis	00000 - 02000 mV	10 mV
F.	Relay 1: Pulse −500> +500 mV>	• Relay 1 mode • Relay 1 range	Pulse -1000 - +2000 mV	-500 - +500 mV
G.	Relay 1 Rate: 120 Pulses/min >	Relay 1 pulse rate	000 - 300 pulses/minute	120 pulses/minute
Н.	Last CAL: 01-01-98	Last calibration date	00 - 00 - 00 - 39 - 39 - 99	01 - 01 - 98

Relay mode and setpoint displays repeat for relay 2 setup

9.3 OPTIONS Menu Setup Parameters (sec. 6.4)

	Menu Parameters	Display Description	Range	Factory Default
А.	Contrast: 3	Display contrast	0 to 5	3
В.	Set 4 mA: -1000 mV >	4 mA setpoint	-1000 - +2000 mV	-1000 mV
C.	Set 20 mA: +1000 mV >	20 mA setpoint	-1000 - +2000 mV	+1000 mV
D.	4 mA Adjust: 4.00 mA >	4 mA adjust	3.0 to 5.0 mA	4.00 mA
Е.	20 mA Adjust: 20.00 mA >	20 mA adjust	19 to 21 mA	20.00 mA

Problem Display Solution 1. 7.04 pH pH electrode installed Remove pH electrode and replace with recommended ORP +25.0°C in preamplifier electrode (sec. 2). (Example↑) Electrode not installed in 2. CHECK 1) Verify preamplifier/electrode input connections and electrode installation (sec. 2). SENSOR ? preamplifier mV input from preampli-2) Disconnect Green and White preamplifier wires from rear T+ and T- terminals. Measure ORP electrode identification resistance across fier disconnected wires for 9.0 k Ω - 10.8 k Ω . If measured resistance out of range (≤ -1000 mV) is out of range: • Wrong electrode installed in preamplifier (pH electrode = $3 \text{ k}\Omega @$ Missing or wrong 25°C (77 °F)) electrode identification • Faulty preamplifier contacts, see preamplifier manual for additional resistance applied to rear information T+ and T- terminals. • Faulty electrode, see electrode manual for additonal information 3) To verify instrument: Disconnect Green and White preamplifier wires from rear T+ and T- terminals, then install a 10 k Ω fixed resistor across the terminals. • Disconnect Brown and Blue preamplifier wires from rear mV Input and Iso. Gnd terminals. Install shorting strap (jumper) across mV Input and Iso. Gnd terminals. • Power instrument and verify 0 mV on the "Input mV" display (sec. 6.3B). If 0 mV ±5 mV are not displayed, the instrument requires factory calibration. If "Input mV" are within ±5 mV, calibrate instrument "Set Standard" for 0 mV (sec. 6.3B). • If instrument displays correctly after calibration, instrument is ok; preamplifier and/or electrode problem exists. Refer to preamplifier and electrode manual for troubleshooting information. 3. Out Of Range pH buffers other than pH Use pH 4 and 7 buffers (ONLY) saturated with Quinhydrone for Use Manual Cal 4 and 7 saturated with EASY CAL procedure (sec. 6.2). The EASY CAL procedure simplifies manual Standard and Slope calibration in the CALIBRATE Menu Quinhydrone used during EASY CAL procedure: (sec. 6). The instrument can be calibrated using two buffers of pH 4= +87 mV, known ORP by this method (sec. 6.3B, 6.3C). If manual pH 7= +264 mV calibration is performed, the EASY CAL procedure is not required. 4. ! Same Buffer Same pH buffer used for Use different buffer saturated with Quinhydrone for EASY CAL EASY CAL solution #1 procedure solution #1 and solution #2 (sec. 7). Do not calibrate and solution #2 both points with the same buffer! 5. ORP: +2000 mV Excessive mV input from Faulty preamplifier, refer to preamplifier manual for additional informa-Input: +2000 mV preamplifier tion (display stuck at To verify instrument input: +2000 mV) · Disconnect Brown and Blue preamplifier wires and install shorting strap (jumper) across rear mV input and Iso Gnd terminals. • Power instrument and verify 0 mV on display. If 0 mV is not displayed, calibrate Standard input for 0 mV (sec. 6.3B) • If instrument displays correctly after calibration, instrument is ok. If error condition persists, instrument requires factory service.

10. Troubleshooting

Display		Problem	Solution
6.	! ORP must be 2000 or less	ORP (mV) input greater than +2000 mV, or improp- erly entered during Stan- dard or Slope calibration	A) Use solution of known ORP within -1000 - +2000 mV range B) Enter mV value within -1000 mV - +2000 mV during stan- dard or slope calibration (sec. 6.3B, 6.3C)
7.	Slope Too Close To Standard	ORP slope calibration too close to ORP standard calibration	(CALIBRATE Menu sec. 6.3 only) Calibrate ORP slope using an ORP solution ≥120 mV from the ORP standard solution (sec. 6.3C).
8.	Value Must Be -1000 Or More	Relay, 4 mA, or 20 mA ORP (mV) setpoint en- tered out of range	Enter ORP setpoint within -1000 - +2000 mV range (sec. 6.3, 6.4)
9.	Value Must Be 2000 Or Less	Relay, 4 mA, or 20 mA ORP (mV) setpoint en- tered out of range	Enter ORP setpoint within -1000 - +2000 mV range (sec. 6.3, 6.4)
10.	Value Must Be 300 Or Less	Relay pulse setting greater than 300 pulses per min- ute	Enter relay pulse setting within 0 - 300 pulses per minute (sec. 6.3F)
11.	SETUP READ ERROR Press any Key	Power fault occurred while saving setup menu entry	Press any key to reload factory defaults then reprogram sys- tem setup parameters.

11. Maintenance

Clean the instrument case and front panel with a soft cloth and a mild soap solution.

Notes:

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