



RP-1000/TS & RP-1200/TS SINGLE/DUAL PROBE ANALYZER (PS-2000)



INSTALLATION & OPERATION MANUAL

**2024-09-10
Firmware Version: 1.21
PS-2000**

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I.a Warnings

CAUTION

Electrical connections should only be undertaken by suitably qualified personnel.

WARNING

POSSIBLE PROCESS UPSETS

All equipment controlled by this product must be secured before any maintenance or repair work.

Adjusting or removing this product while it is in the system may upset the process being controlled, possibly causing injury, property damage, or death.

WARNING

ELECTRICAL SHOCK HAZARD

Equipment powered by AC line voltage presents a potential electric shock hazard to the user. Make sure that the system power is disconnected from the system before attempting electrical connections or service. In instances where troubleshooting must be performed under a “power on” condition, make certain that the immediate area is dry and well lighted; the test leads are properly insulated; and all other safety precautions be observed to prevent a potential electrical shock hazard.

CAUTION

Some of the IC devices used in the instrument are static sensitive and may be damaged by improper handling. When servicing the instrument electronics, use of a grounded wrist strap is recommended to avoid accidental damage to the IC chips on the instrument.

CAUTION

Grounding of this instrument should be in accordance with national and local electrical codes. If the instrument is not grounded line voltage may be present on the instrument ground plane which may possibly result in personal injury during maintenance or repair.

Caution

The gas sensor/probe (when applicable) elements are vulnerable to solvent vapors. Exposure to these vapors will poison the sensing element and render the sensor/probe unusable.

I. INTRODUCTION

The RP-1000 (single probe) and RP-1200 (dual probe) series of microprocessor based instruments monitor the signal from chemical transducers (e.g., chlorine, Cl_2 , and fluoride, F^- , or pH. The measured value can be re transmitted to a SCADA system using a 4-20mA signal. Up to three set points per probe are available (low and high level).

II. SPECIFICATIONS

Power Supply	115/230 VAC Switch select-able.
Power Consumption	< 12W
Display (HMI)	Back-lit 3.5" color touchscreen.
CPU	PIC32, 512MB flash, 128kB RAM
Relays	Six, Mechanical (AC or DC), Rating (standard) 250 VAC @ 3A, 32 VDC @ 3A
Mounting	Wall mount, 15" by 17" area. Less than a 12" depth.
Probes(s)	Chlorine (PV1); Fluoride or pH (PV4). ORP is planned.
Temperature range	41-113 °F, 5-45 °C
Analog Output	Three Isolated, 4 to 20mA, 650 ohm drive. List of outputs: Probe one, probe two, and (optional) pH probe temperature.
Digital Output	RS-232/485 serial (future) - Modbus-RTU only
Instrument Range:	Dependent on the sensor (up to 9999 limited by sensor range)
Probe Location:	Board mounted with flow cell.
Speed of Response:	Up to ten updates per second.
Electronics Enclosure:	NEMA 4X
Optional accessories:	Profibus communications, Wired Ethernet, Wi-Fi connectivity, Wired EtherNet/IP
Data logging (future):	FAT-32 formatted micro-SD - Optional micro-SD battery card for safe power down if main power is lost.
Field Firmware Update:	USB, FAT-32 formatted thumb drive (standard)

*The data logging is not supported at this time but is a planned addition if it is requested.
Contact info@eaglemicrosystems.com for information regarding RP-1x00/TS data logging.

Note: The RP-1000/TS and RP-1200/TS utilize the PS-2000 instrument platform. Any reference to the PS-2000 also refers to the RP-1x00/TS instrument.

III. Installation and startup

Before opening the box the equipment was shipped in, inspect it for damage. If damage occurred during shipping file a claim with the carrier.

Packing List:

- RP-1000/TS (single probe) or RP-1200/TS (dual probe) mounted on a back-plate.
- If a fluoride or pH probe has been specified, the PS-2000C-EXP-PROBE module with a BNC connector is present. Both will be preinstalled on the PS-2000.
- In the case of a pH probe with ATC (1000 ohm RTD), the PS-2000C-EXP-RTD module is also installed on the PS-2000C-EXP-PROBE board. This board is only included if a probe with ATC (automatic temperature compensation) has been ordered, which is not common.
- One or two probes as specified by the order. These probes are typically not preinstalled.
- One packet of cable glands / strain reliefs and terminal blocks inside the PS-2000 enclosure. Note: The cable glands may be pre-installed.



Note: Full wiring diagrams and board Legends are located at the end of the manual.

Installation:

1. Bolt the RP-1000/TS (single probe) or RP-1200/TS to the wall.
2. Connect the water supply to be monitored. The flow rate must be limited.
3. Select the appropriate supply voltage (115V/230V) by S1 (upper left of the PS-2000 main board).
4. A qualified electrician should wire main power to TB1, wire the probes, 4-20mA outputs, and relays as needed. The pH/Fluoride probes utilize a BNC connector.

IMPORTANT

Insure all holes present on the PS-2000 enclosure are occupied and sealed (e.g., cable gland with a plug). Failure to properly seal the enclosure will result in board contamination and premature failure over a short period of time.

Included are cable gland plugs to facilitate sealing. A short length (<2") of cable can substitute for the rubber inserts when inserted into the cable gland.

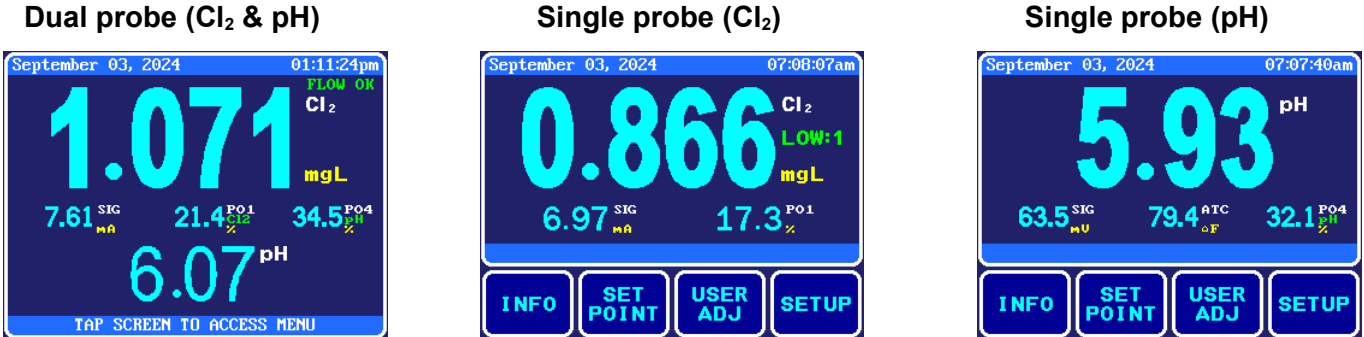
Be sure the cable glands are tightly grasping the cables and inserts.

IV. General Operation

The RP-1000 (single probe) and RP-1200 (dual probe) features a touchscreen interface (HMI) to guide the user through the operation of the instrument.

IV.a Main Operating Screen

Each probe has a dedicated output position on the operating screen. The measured value of the probe is reported as well as status and PO level (4-20mA output to the SCADA) in percentage.



STATUS

The status displays the alarm status or signal loss.

NoS: Shown at the SIG value

LOW:n: Low-level set point and the energized relay number (1 thru 6)

HIGH:n: High-level set point and the energized relay number (1 thru 6)

FLOW OK/NO FLOW

If the probe mounting block has a flow switch, the state can be displayed on the main screen. See the P1180 FLOW SW (IN0) parameter. The water flow rate through the probe block must be limited, and the flow switch can indicate the proper flow rate has been obtained. This function is associated with the Cl₂ probe only.

POx: 4-20mA output level in percentage representing the probe signal. The range can be set by the user independent of the actual probe range (e.g., a 0-5ppm probe can send a 0-2ppm 4-20mA signal to the SCADA).

SIG: This is the probe signal in milliamperes (Cl₂) or millivolts (pH or Fluoride).

IV.e Main Menu

RP-1200: Tapping the screen accesses the main menu.

RP-1000: The screen always shows the main menu.

INFO: This menu displays instrument firmware version

SETUP: Configuration and calibration access. Requires password (0000 is the default). The password screen is shown to the right.

SET POINT: If any set points are enabled, this option is available. The set point values (low-level and/or high-level) are adjusted under the menu choice.

USER ADJ: User interface adjustments are located in this menu including color scheme and beeper volume. The time and date are set under this menu.



Setup: This menu is password protected(default 0000) and allows the calibration, configuration, and passwords to be set. Refer to the parameter list and calibration procedure sections of the manual for more information. The values in the calibration and configuration menus all follow the pattern of using the up and down arrows to navigate followed by pressing adjust to change them and then using the left arrow to save.



IV.f Configuration Parameter List

Below is a list of parameters in the configuration menu, listed in the format of their parameter number, descriptions, and their default values (in some cases). Some parameters are usually set by Eagle Microsystems and require no additional adjustment.

PV1 Cl2 PROBE PARAMETERS

P1100 PV1 Cl2 PROBE

Enable the Cl₂ probe (PV1) by settings this parameter to YES.

P1101 PV1/RES UNITS

Sets the Cl₂ residual units, and the choices are ppm or mgL. The Cl₂ value doesn't change, as both are 1 in 1,000,000.

P1102 PV1/RES MAX

Sets the display reading at a 20mA probe signal input (e.g., 5ppm @ 20mA). The value of this parameter must match the probe range as stated by the probe manufacturer or the meter will not produce the correct chlorine reading.

P1102 PV1/RES DIV

Sets the level decimal point (1, 0.1, 0.01, or 0.001). The internal calculations are not dependent on this parameter, so higher resolutions will not increase accuracy.

P1103 PV1/RES MIN

Sets the probe value at 4mA, which is typically 0ppm. The value of this parameter must match the probe range as stated by the probe manufacturer or the meter will not produce the correct chlorine reading.

P1105 PV1/RES AVG

Sets the PV1 display update rate from ten per second to one update every ten seconds. The choices are 0.1s, 0.2s, 0.3s, 0.4s, 0.5s, 0.8s, 1s, 2s, 3s, 4s, 5s, or 10s. Higher values yield a more stable display.

P1110 PO1 20mA

Sets the probe chlorine value at which the analog output (PO1) will output a 20mA signal. The default value will be set to the same range as the probe (e.g., P1110 will be set to 5ppm if the probe is 5ppm).

P1180 FLOW SW (IN0)

Enables the FLOW OK/NO FLOW text on the main display. IN0 is the switch input. See wiring diagrams. The flow switch may also contain its own light indicator.

PV4 PROBE PARAMETERS

P1400 PV4 PROBE SEL

Selects the probe connected to the BNC (PV4). The PS-2000C-EXP-PROBE module is preinstalled on the PS-2000-IO board. The choices are NONE, pH, or FLUORIDE. Be sure to select the correct amplifier gain via the P1 jumper located on the PS-2000C-EXP-PROBE module.

P1401 ADC SYNC

Enables power line or internal synchronization. The power line must be very clean for the AC LINE selection. Select the **INT 50 Hz** or **INT 60 Hz** that matches the line frequency at your location. The choices are AC LINE, INT 50Hz, or INT 60Hz.

pH PROBE PARAMETERS

P1411 PV4 pH MAX

Sets the pH that represents the maximum set point limit and the PO4, 20mA endpoint. Typical choices are 10 pH or 14 pH.

P1412 PV4 pH MIN

Sets the pH that represents the minimum set point limit and the PO4, 4mA endpoint. Typical settings are 0 pH or 4 pH.

P1413 PV4 pH AVG

Sets the pH PV4 display update rate from ten per second to one update every ten seconds. The choices are 0.1s,0.2s,0.3s,0.4s,0.5s,0.8s,1s,2s,3s,4s,5s, or 10s. Higher values yield a more stable display.

FLUORIDE PROBE PARAMETERS

P1410 FLUORIDE UNITS

Sets the fluoride units. The choices are ppm or mgL.

P1411 PV4 FLU MAX

Sets the fluoride level that represents the maximum set point limit and the PO4, 20mA endpoint.

P1412 PV4 FLU MIN

Sets the fluoride level that represents the minimum set point limit and the PO4, 4mA endpoint. Note: Fluoride probes cannot read a zero output, but this parameter can be set to zero.

P1413,PV4 FLU AVG

Sets the PV4 (fluoride) display update rate from ten per second to one update every ten seconds. The choices are 0.1s,0.2s,0.3s,0.4s,0.5s,0.8s,1s,2s,3s,4s,5s, or 10s. Higher values yield a more stable display.

SET POINT PARAMETERS

PV1 and PV4 support up to three set points for each channel. The user can choose their operation.

P1x9u,PVx SPn MODE

Selects the set point mode of operation.

OFF: Deactivate the set point

LOW: When the PV level is equal to or below the set point for the time set by the PVx SPx DLY setting, relay PVx SPn RLY is energized. When the set point rises above the set point value, the associated relay is de-energized.

HIGH: When the PV level is equal to or above the set point for the time set by the PVx SPx DLY setting, relay PVx SPn RLY is energized. When the set point falls below the set point value, the associated relay is de-energized.

P1x9u PVx SPn RLY

Select the relay for the associated set point. The relays can be shared with multiple set points. The choices are OFF, K1, K2, K3, K4, K5, and K6. Setting this parameter to OFF will show the message on the display, but no relay will be controlled.

P1x9u PV1 SP1 DLY

Sets the delay the set point must be exceeded before the relay and display message are both activated. It is set in seconds (default is 3s).

USER MENU

The user menu allows the user to set non-critical parameters such as the beeper volume, back-light level & saver, and the theme. The time and date is set under this menu, which is needed for the data logger, event logger, and file writes to the micro-SD card.

P9990 TAP ACK BEEPER

Sets the volume level of the internal small beeper. This parameter does not control the 103dB alarm beeper if present.

The choices are OFF, LOW, or HIGH/

P9991 BACKLIGHT SAVER

When set to ON, the LCD back-light is dimmed to conserve power and increase the longevity of the LEDs. The back-saver delay is 5-minutes. When the screen is tapped, the brightness level selected by BACKLIGHT LEVEL is restored.

P9992 BACKLIGHT LEVEL

Sets the level of the back-light, and the choices are 20%,40%,60%,80%,100%.

P9993 COLOR THEME

Some choices may be better for installations where the instrument is exposed to higher brightness areas. The choices are BLUE,GRAY,BLACK,GREEN LCD MONO,B&W,INVERSE COLOR, or GREEN.

P9994 TIME MODE

Selects the 24 hr or 12 hr time display and the format stored in the log file(s).

P9995 DATE FORMAT

Selects the format of the date display and the format stored in the log file(s).

Choices are MONTH DD YYYY, YYYY-MM-DD, MM-DD-YY, and MONTH DD YYYY.

MONTH denotes the full spelling of the month. MM denotes the month from 01 to 12.

PROBE CALIBRATION MENU

Tap SETUP, enter PASSWORD (if prompted), and then CAL.

Calibration Menu (CAL): **The options available are dependent on the number of probes (one or two) enabled and if a ATC pH probe is used.**

PV1 CH1: Calibrate the chlorine (Cl_2) probe.

PO1: Calibrate the 4-20mA output for the Cl_2 probe.

PV4 mV: Calibrate the mV signal for the probe input to increase the accuracy of the mV reading.

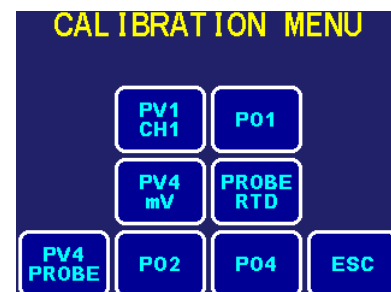
PROBE RTD: Calibrate the 1000 Ω or 100 Ω RTD. The RTD calibration is performed by the factory.

PV4 PROBE: Calibrate the probe using buffers.

PO2: Calibrate the 4-20mA output for the pH ATC RTD.

PO4: Calibrate the 4-20mA output for the pH or Fluoride probe.

ESC: Return to the setup menu.



V.c Output Calibration (4-20 mA DC) – *Tap PO1, PO2, or PO4

The user can calibrate the 4-20 mA DC outputs by following the below procedure. From the main menu press SETUP (PW 0000)→CAL, then select one of the process output (POx) for the channel you want to calibrate.

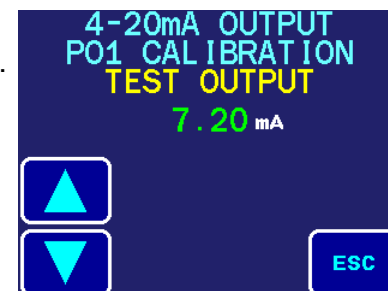
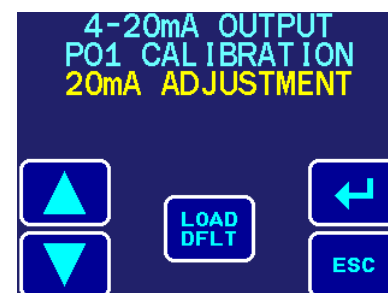
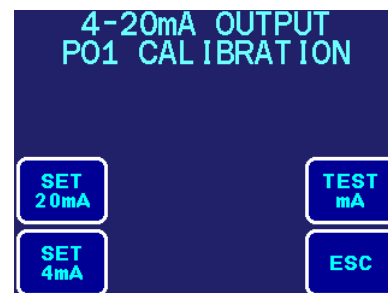
* The POx selections are dependent on the installed options.

To calibrate the process output (POx), one must connect either a DMM (mA input) or other device that can read the current output. The device should have, at least, 0.01mA precision.

- Enter the Output POx calibration screen from the calibration menu.
- Press the set 4mA button and the mA meter should read around 4.00mA.
- Use the up and down arrow buttons to set the output to exactly 4.00mA.
- Press enter(left arrow) to accept the new value or ESC to discard the new value.
- Press the set 20mA button; the mA meter should read around 20.00mA.
- Use the up and down arrow buttons to set the output to exactly 20.00mA.
- Press ENT to accept the new value or ESC to discard the new value.
- The two points are not interactive so one should not need to readjust each point again.
- Press the ESC push button to go back to the POx selection menu.

TEST mA (TEST SIGNAL)

This screen sends a 4-20mA test signal to the SCADA system. Eleven levels from 4.0mA to 20mA (1.6mA change per level) are available (4.0, 5.6, 7.2, 8.8, 10.4, 12.0, 13.6, 15.2, 16.8, 18.4, and 20mA).



Cl₂ PROBE CALIBRATION SCREENS

Refer to the probe manufacture's manual regarding calibration of the sensor. Most sensors require a period of time to allow the sensor to become stabilized (e.g, when the sensor is new, the sensor should be allowed 12 hours+ to stabilize). The pH level is also a factor.

There are two calibration methods used by the RP-1x00/TS:

- 4mA and 20mA endpoint normalization, which is not a true Cl₂ probe calibration. It is
- ZERO/SPAN using ppm/mg/L units, which is used to calibrate the probe connected to the RP-1x00/TS meter so the display reads the proper Cl₂ value.

SPAN: Enter the Cl₂ level in ppm/mg/L after determining the correct level by external analysis. See CAL HOLD...

ZERO: If the Cl₂ level is zero but the reading is non-zero, tap ZERO to null out the reading.

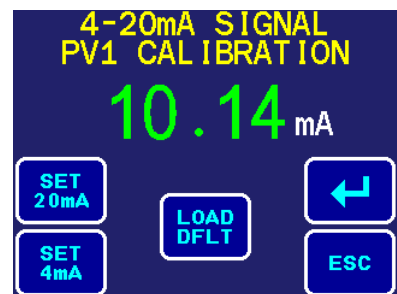
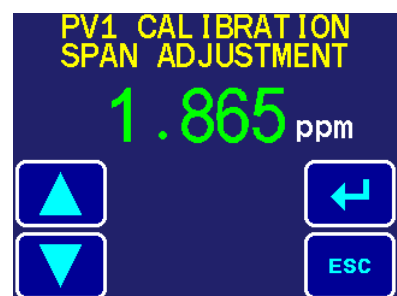
CAL HOLD: If a sample of water must be acquired local to the probe and must be analyzed for the Cl₂ level, tap CAL HOLD to store the current level until the Cl₂ level can be entered into the RP-1x00/TS. This function is useful, as the level detected by the probe can change after the water sample Cl₂ level has been determined. The water flowing through the RP-1x20 flow cell block should never stop. When the CAL HOLD is active, HOLD is displayed and the reading is frozen.

RE-SUME: Unfreeze the PV1 CAL HOLD operation.

CAL 4-20: This allows one to normalize the 4-20mA PV1 signal to a standard. An industrial DMM such as the Fluke 787 is used for this purpose. Note: When the 4mA and 20mA endpoints are set, the PV1 unit calibration using ZERO/SPAN is set to zero and P1102 PV1/RES MAX for the SPAN.

ENTER: (←): Save the ZERO/SPAN or 4/20mA changes when the user returns to the main screen.

ESC: Discard any ZERO/SPAN or 4/20mA CAL changes and restore the PV1 calibration if altered.



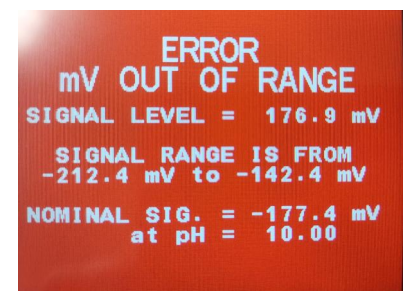
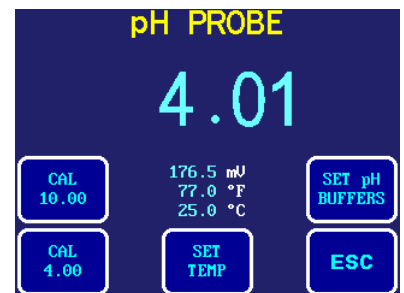
pH PROBE CALIBRATION

The pH calibration is set up as a two point calibration as standard, but it's possible to perform a single point calibration.

If only one buffer solution is used (single point calibration), one of the CAL x.xx buttons must be set to 7 pH. One can calibrate the probe with distilled water if the pH = 7, which should produce a close to zero mV input (ideal is 0mV). *Note (from sciencing.com): The pH of distilled water immediately after distillation is 7, but within hours after distillation, it has absorbed carbon dioxide from the atmosphere and become acidic with a pH of 5.8.*

Alternatively, one can simply electrically zero the pH input, which is equivalent to a pH of 7. Remove the pH BNC probe connector and short the BNC on the RP-1x00/TS. A crude way to short the BNC on the RP' is to use a bent paper clip. The mV reading should be as close to zero (0.0mV preferred). This operation should be performed at least once when the RP is first installed. *Let Eagle Microsystems, Inc. know only one buffer solution is going to be used, and we'll perform this step.*

- Enter the PV4 calibration mode by tapping PV4 PROBE under the CALIBRATION MENU.
- The calibration buffer solutions must be entered under the SET pH BUFFER menu. The CAL x.xx buttons will show the buffer solution set.
- The actual temperature of the probe should be displayed. If the probe doesn't have automatic temperature compensation (Pt-1000), the user must enter the temperature of the buffer solution by tapping SET TEMP..
- Place the sensor probe into the a pH solution and allow the temperature to stabilize. Constant stirring is typically required for accurate readings. What for this value to stabilize (within 2-3mV).
- Tap correct the buffer CAL x.xx button. If the mV value for the buffer solution is within the acceptable range, the reading is stored. If the mV is out of bounds, the red error screen to the right is displayed. It shows the reading from the probe and the acceptable mV range.
- Rinse the probe.
- Repeat the above again for the second buffer solution if used.
- Tap ESC until the main screen is display to permanently store the calibration.



AUTOMATIC TEMPERATURE PROBE (RTD) CONNECTIONS

- If automatic temperature compensation (i.e., no RTD) is not embedded in the probe, make sure all connections on TB1 are open (i.e., not connected).
- Some sensors will have two wire colors that are the same, connect one to the A terminal and the other to the B terminal.
- The pH probe output must be reliably connected to the BNC connector. Do not splice/extend the probe cable.
- Run the RTD wires through one of the provided cable glands on the PS-2000 enclosure.

Calibration FAIL...

Cause: The calibration process yielded a "slope" less than 30 mV/pH or greater than 90 mV/pH, or an offset from the expected mV reading that is greater than 35 mV. This may be caused by an incorrect calibration attempt or defective electrode, cable, buffer solution or wiring.

Correction: Use this table as a guide when calibrating your pH electrode. It lists the most common buffers and their corresponding **mV** readings when used at different temperatures.

pH	TEMPERATURE (T) in degrees Celsius/Fahrenheit									
	0/32	5/41	10/50	15/59	20/68	25/77	30/86	35/95	45/113	50/122
14	-379.4	-386.3	-393.3	-400.2	-407.1	-414.1	-421.0	-428.0	-441.9	-448.8
13	-325.2	-331.1	-337.1	-343.0	-349.0	-354.9	-360.9	-366.8	-378.7	-384.7
12	-271.0	-275.9	-280.9	-285.9	-290.8	-295.8	-300.7	-305.7	-315.6	-320.6
11	-216.8	-220.7	-224.7	-228.7	-232.7	-236.6	-240.6	-244.6	-252.5	-256.5
10	-162.6	-165.6	-168.5	-171.5	-174.5	-177.5	-180.4	-183.4	-189.4	-192.3
9	-108.4	-110.4	-112.4	-114.3	-116.3	-118.3	-120.3	-122.3	-126.2	-128.2
8	-54.2	-55.2	-56.2	-57.2	-58.2	-59.2	-60.1	-61.1	-63.1	-64.1
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	54.2	55.2	56.2	57.2	58.2	59.2	60.1	61.1	63.1	64.1
5	108.4	110.4	112.4	114.3	116.3	118.3	120.3	122.3	126.2	128.2
4	162.6	165.6	168.5	171.5	174.5	177.5	180.4	183.4	189.4	192.3
3	216.8	220.7	224.7	228.7	232.7	236.6	240.6	244.6	252.5	256.5
2	271.0	275.9	280.9	285.9	290.8	295.8	300.7	305.7	315.6	320.6
1	325.2	331.1	337.1	343.0	349.0	354.9	360.9	366.8	378.7	384.7
0	379.4	386.3	393.3	400.2	407.1	414.1	421.0	428.0	441.9	448.8

$$mV = 0.1984(T+273.16)(7 - pH)$$

If the readings do not match these guidelines, try to determine if the monitor or the pH electrode is at fault. Disconnect the pH electrode from the BNC connector. Use a pH simulator to give the unit a known mV input. If the unit reads correctly, then the electrode or its cable is at fault. If a simulator is not available, one can use a bent paper clip to short the outside shell of the BNC connector to the inside contact of the BNC connector. This should simulate pH of 7 or 0mV. If the reading is between -10mV and +10mV then the electrode is probably at fault. If the reading does not improve with a new electrode, contact Eagle Microsystems customer service.

pH doesn't match the pH reading of another meter...

Causes:

- A. Incorrect calibration of either or both meters.
- B. Inconsistency between electrodes.
- C. Lab meter's electrode is not at the same temperature as the process.
- D. Analysis sample taken from different location than the process sample.
- E. Contaminated probe...

Correction: This is a complex problem that can best be corrected with some simple guidelines. Make sure all process related variables are taken into consideration. Calibrate both meters with the same buffer solutions, carefully following the manufactures guidelines. If the process measurement is being done at an elevated temperature, make certain that the lab meter's sample has been heated to the same temperature as the process. If all of these suggestions are followed and the pH still does not match, recalibrate the unit using the CAL.2P process.

FLUORIDE PROBE CALIBRATION

The fluoride probe calibrates similarly to the pH but without the temperature.

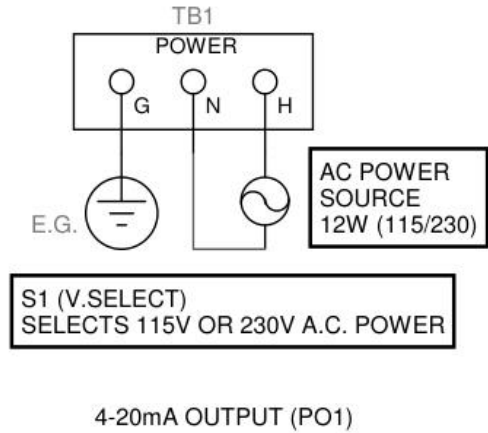
Like the pH buffers, the two fluoride standards must be entered. There is no single point calibration for fluoride. Common standards are 0.2 and 1.0 ppm/mgL.

Fluoride probes cannot read zero ppm/mgL.

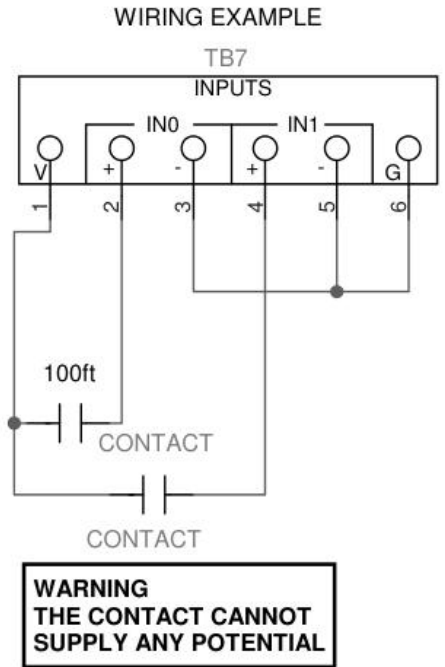
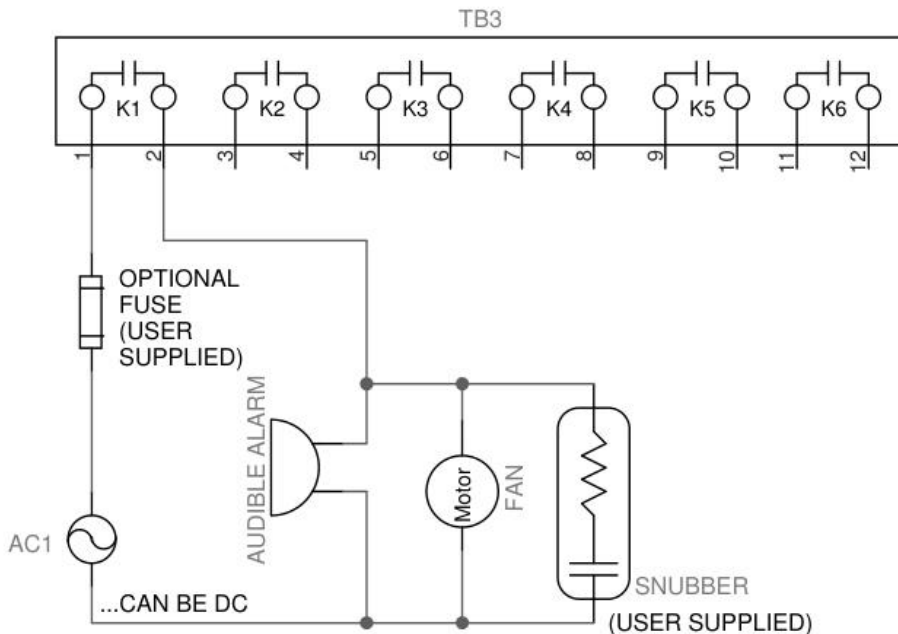
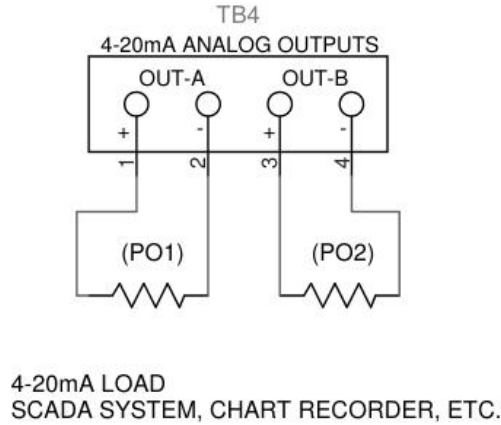
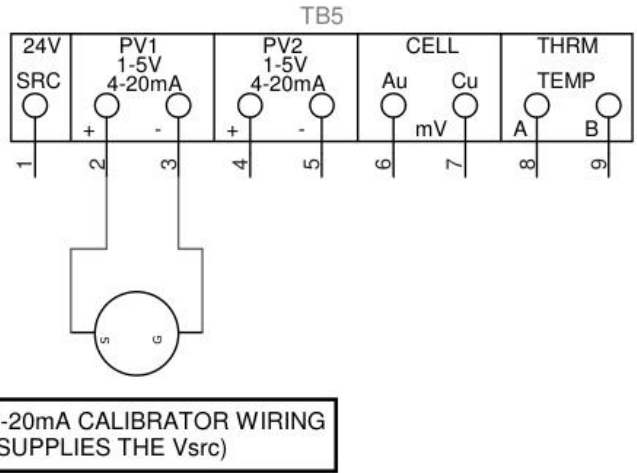
Refer to the fluoride probe manual for calibration details.



PS-2000-IO WIRING

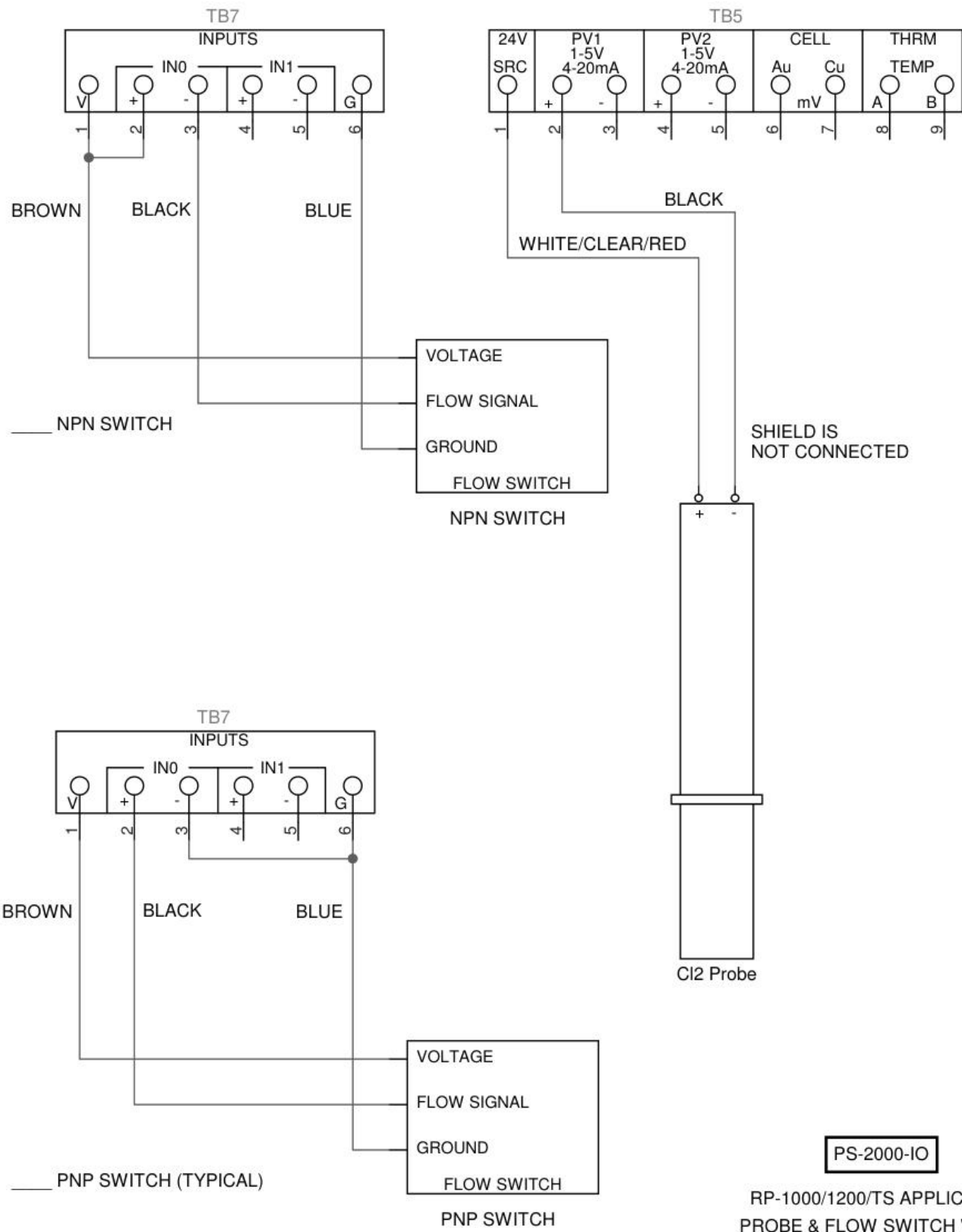


NOTE: PV1 & PV2 share common negative (TB3-3 & 5) if J1 and J2 both have G selected.



EAGLE MICROSYSTEMS, INC

PS-2000-IO 4-20mA PV1 (CI2) PROBE WIRING AND FLOW SWITCH



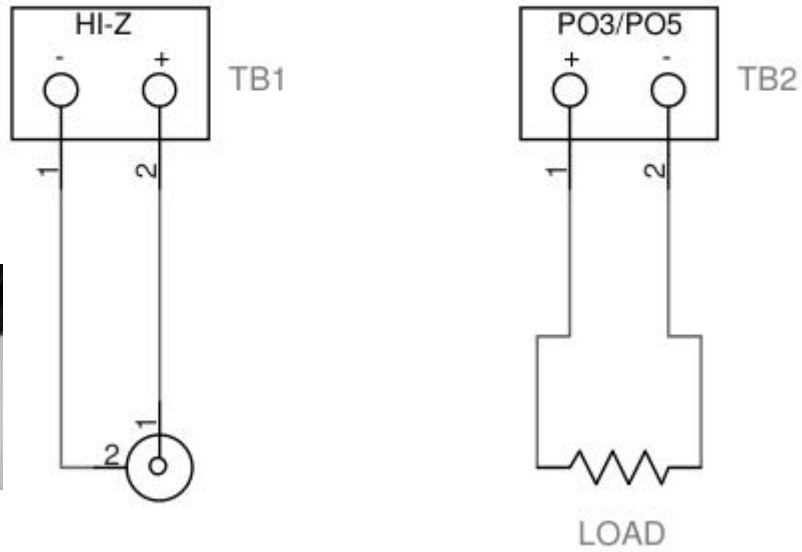
PV4 PROBE WIRING

RP-1200/TS

PROBE (BNC)

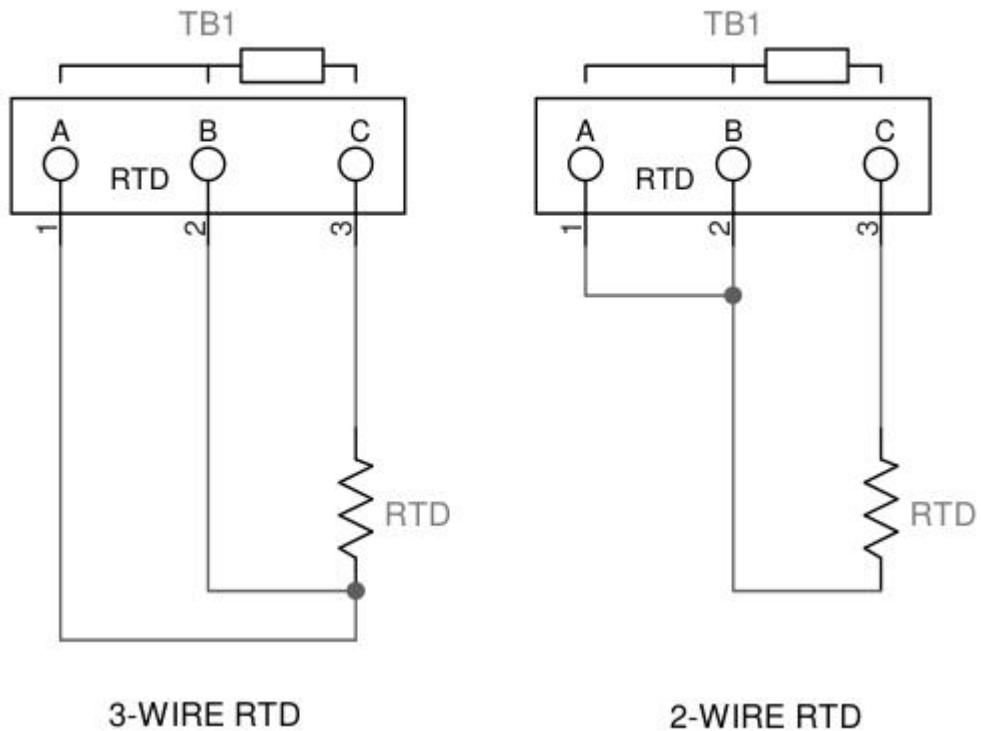
4-20mA

PS-2000C-EXP-PROBE



OPTIONAL pH ATC PROBE TEMPERATURE WIRING (2-wire is common)

PS-2000C-EXP-RTD



HARDWARE TERMINAL BLOCKS

TB1 (PS-2000-IO) – POWER INPUT - A.C. power connections

1	G	Ground	Earth ground line
2	N	Neutral	Non-fused neutral line
3	H	Hot	Fused line connects to the hot side of the AC power.

TB2 (PS-2000-IO) – ACCESSORY POWER OUTPUT - Fused by F1 (½ Ampere)

1	N	Neutral	Non-fused neutral line
2	H	Hot	Fused line connects to the hot side of the AC power.

TB3 (PS-2000-IO) – RELAYS – Set point relay contacts

The relays, which are mechanical, can switch 3A, 250VAC or 32VDC loads.

The contacts are “dry;” they do not have any potential and are only switches.

1	K1	Dry contact	Assignable relay contact N/O (low/high level, etc.)
2	K1		
3	K2	Dry contact	Assignable relay contact N/O (low/high level, etc.)
4	K2		
5	K3	Dry contact	Assignable relay contact N/O (low/high level, etc.)
6	K3		
7	K4	Dry contact	Assignable relay contact N/O (low/high level, etc.)
8	K4		
9	K5	Dry contact	Assignable relay contact N/O (low/high level, etc.)
10	K5		
11	K6	Dry contact	Assignable relay contact N/O (low/high level, etc.)
12	K6		

TB4 (PS-2000-IO) – ANALOG OUT – 4-20mA analog outputs

1	+	OUT A positive signal	Channel A, active 4-20mA analog output CI2 probe
2	-	OUT A negative signal	
3	+	OUT B positive signal	Channel B, active 4-20mA analog output.
4	-	OUT B negative signal	

TB7 (PS-2000-IO) – SWITCH INPUTS

1	Vps	POWER SUPPLY OUT	24V (+/-10%) POWER SUPPLY OUTPUT (100mA absolute max)
2	+IN0	DISCRETE INPUT 0	Isolated switch input 0 (unassigned)
3	-IN0		
4	+IN1	DISCRETE INPUT 1	Isolated switch input 1 (unassigned)
5	-IN1		
6	SGND	COMMON	Signal ground

TB6 (PS-2000-IO) – Serial I/O for network interface modules (non-isolated from the CI2 probe).

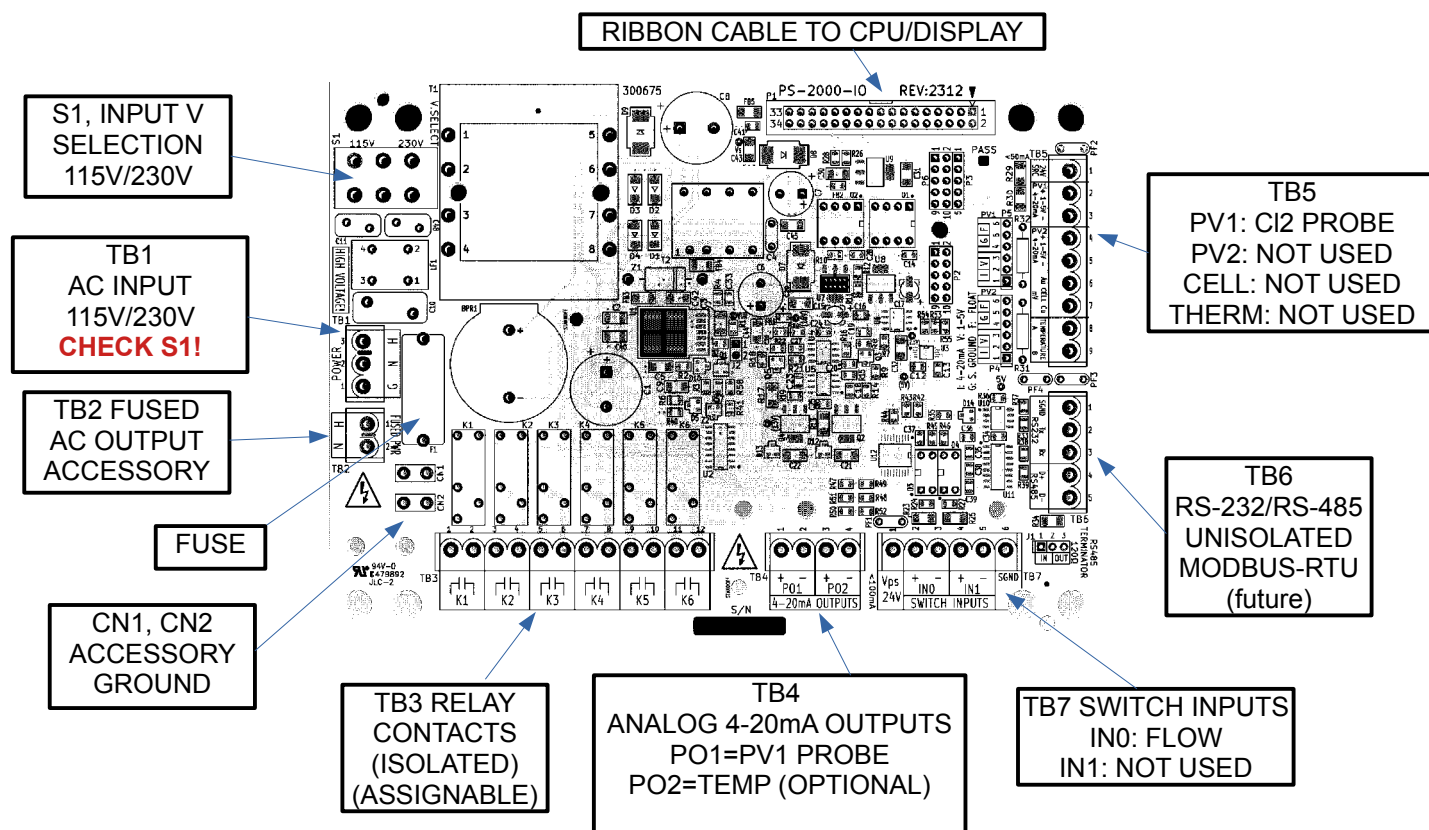
1	SGND	Common	This is signal ground for the RS-485 & RS-232 interface.
2	Tx	RS-232 Transmit	Full-duplex RS-232 interface
3	Rx	RS-232 Receive	
4	D+	RS485 – D+ line	Half-duplex RS485 interface.
5	D-	RS485 – D- line	

The signal ground (SGND) is not connected to earth ground.

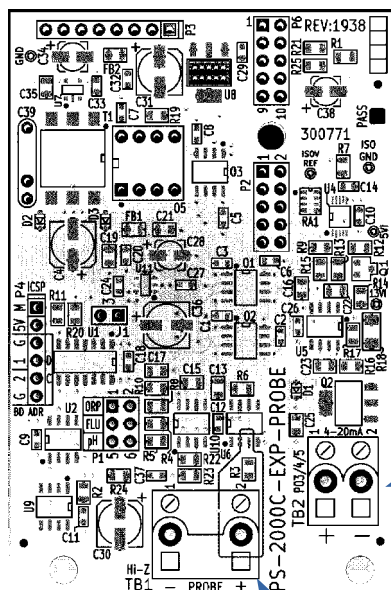
TB5 (PS-2000-IO) – ANALOG INPUTS

1	24V SRC	24V SOURCE	24V (+/-10%) POWER SUPPLY OUTPUT FOR PROBE (50mA absolute max)
2	PV1+	PROBE INPUT 1	Cl ₂ PROBE INPUT (250 ohm input resistance) NOTE: The probe must connect to 24V SRC (+ from probe) and PV1+ (- from the probe). Do not connect the probe to PV1- unless the probe is three-wire (which has never been the case).
3	PV1-		
4	PV2+	4-20mA/1-5V INPUT 2	UNUSED PROCESS VALUE INPUT 2 (not used)
5	PV2-		
6	Au	CELL INPUT	Au/Cu CELL BASED RESIDUAL ANALYZER (not used)
7	Cu		
8	A	TEMP INPUT	10k THERMISTER SENSOR INPUT
9	B		

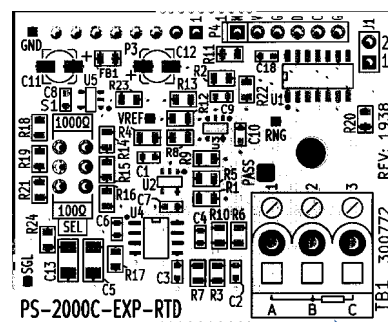
PS-2000-IO PC BOARD



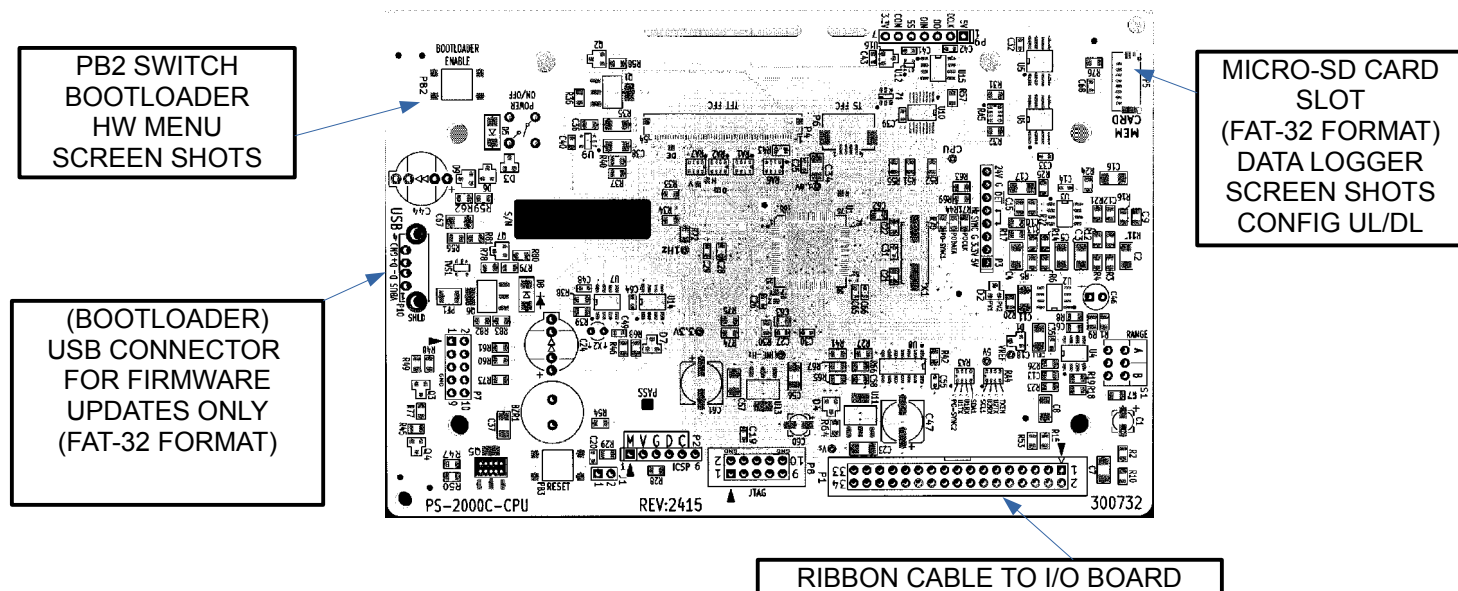
PS-2000C-EXP-PROBE (RP-1200/TS) (MOUNTED ON PS-2000-IO)



PS-2000C-EXP-RTD (RP-1200/TS OPTION) MOUNTED ON PS-2000C-EXP-PROBE



PS-2000 CPU/DSP BOARD



VIII. Troubleshooting

Instrument does not light.	- Check that 115 VAC (230VAC if used) is reaching TB1. - Check that the ribbon cable to the display is plugged in at both ends and fully seated. - Make sure power is disconnected and then remove fuse and check for continuity. - Check "V SELECT" switch is set for the input voltage in use. Never change this switch with the power on!
Instrument lights but does not show anything on the display.	Check everything but the fuse in the "Instrument does not light" section.
Verify indicator operation.	- Disconnect the sensor. Wire a 4-20mA generator as shown under "4-20mA POWERED (ACTIVE) CALIBRATOR WIRING" in the diagram section. - Injecting 4mA will give a 0ppm reading and 20mA will give a 30ppm (or full-scale) reading if the unit was setup for a standard Cl₂ sensor.
Instrument shows high or drifting readings when first powered up but settles to a stable reading within a minute or two.	This is not a problem. The probes need to stabilize when first powered up.

Warranty

Standard Warranty

Eagle Microsystems warrants our products and accessories to be free from defects in material and workmanship for a period of twelve (12) months from date of start up or eighteen (18) months from date of shipment, whichever occurs first. Eagle Microsystems, in its sole discretion, shall determine warrantability of the alleged defect. Eagle Microsystems' liability, under this guarantee, shall be limited to repairing or replacing defective equipment during this period except as noted below.

1. Any other products purchased from another manufacturer and incorporated into Eagle Microsystems products shall be warranted only to the extent that it is warranted by the original manufacturer. Examples are motors, vibrators, sensors etc.

Eagle Microsystems' liability under this guarantee shall be limited to repairing or replacing defective equipment during this period. Determination of whether damage or failure is warrantable shall be at the sole discretion of Eagle Microsystems. As a condition of this guarantee, such defects must be brought to Eagle Microsystems attention for verification as soon as possible, and, if required, returned to the Eagle Microsystems factory. Eagle Microsystems shall not be liable for transportation, installation or costs incurred in the removal of said equipment for repair or replacement, or for damages from delay, loss of use or any other related damages or costs of any kind. Eagle reserves the right to improve the equipment to incorporate latest designs.

This warranty shall not apply to any product or accessory which has been modified or repaired independent of Eagle Microsystems direction or control. This warranty shall become null and void if inspection by Eagle Microsystems reveals the equipment was misused, neglected or damaged by any cause other than normal and reasonable use.

PROBE WARRANTY

Eagle Microsystems, Inc. does not provide any warranty for the probes. Please refer to the probe manufacturer manual(s) included with the probe for information. Use care when handling the probes, as they are very delicate devices. Damaged probes are not covered by Eagle Microsystems, Inc.

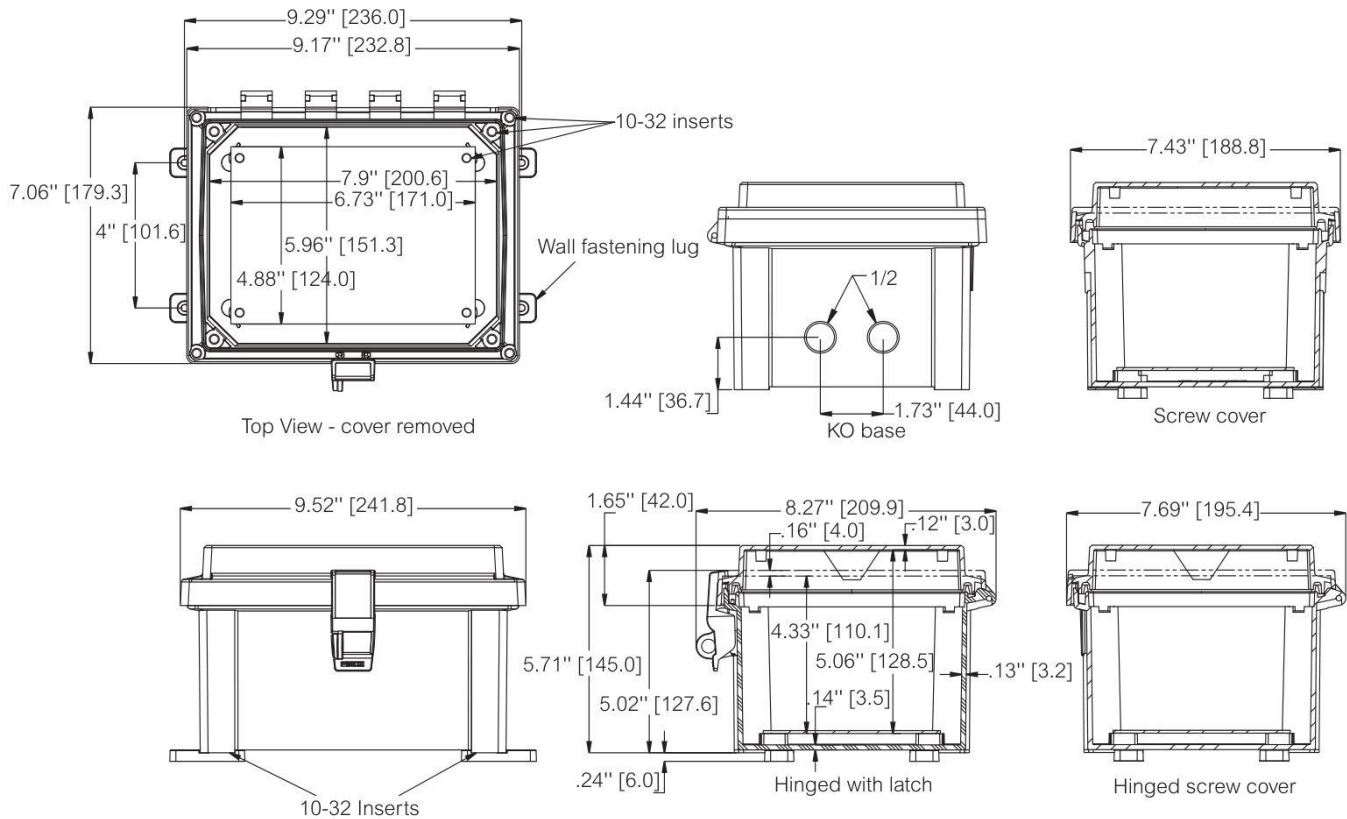
If a probe is not functioning properly, consult the manufacture's probe manual for possible solutions (cleaning and maintenance).

Notes:

PS-2000 (only) ENCLOSURE DIMENSIONS

Fibox AR865CHSC

The image below is from the Fibox datasheet



© Fibox Oy, Data subject to change without notice (printed: 7.5.2018)

- The dimensions do not include the cable glands supplied by Eagle Microsystems.
- The wiring is typically routed from the bottom of the enclosure.
- There are no cable glands mounted to the sides or top of the enclosure.
- The RP-1x00/TS instrument is mounted on a 17in by 15in backpanel with the probe block.

IMPORTANT

- **Insure all holes present on the PS-2000 enclosure are occupied and sealed (e.g., cable gland with a plug). Failure to properly seal the enclosure will result in board contamination and premature failure over a short period of time.**
- **Included are cable gland plugs to facilitate sealing. A short length (<2") of cable can substitute for the rubber inserts when inserted into the cable gland.**
- **Be sure the cable glands are tightly grasping the cables and inserts.**

RP-1000/TS, RP-1200/TS (PS-2000) ROUTING TICKET

SO#: _____
PROGRAM: PS-2000-STD
VERSION: _____
PROBE 1 _____
SN: _____

DATE: _____
SERIAL #: _____
PCB REV: _____
PROBE 2 _____
SN: _____

PROBE 1, PV1 (CI2)			PROBE 2, PV4 (pH or Fluoride)		
PARAMETER	DFLT	USER	PARAMETER	DFLT	USER
P1100,PV1 CI2 PROBE	ON		P1400,PV4 PROBE SEL	pH	
P1101,PV1/RES UNITS	ppm		P1401,ADC SYNC	INT 60Hz	
P1102,PV1/RES MAX	5.000		P1410,FLUORIDE UNITS	ppm	
P1102,PV1/RES DIV	0.001		P1411,PV4 pH/FLU MAX	1	
P1103,PV1/RES MIN	0		P1412,PV4 pH/FLU MIN	0.2	
P1105,PV1/RES AVG	0.5s		P1413,PV4 pH/FLU AVG	0.5s	
P1110,PO1 20mA	5.000				
P1180, PV1 FLOW SW	ON				
P1191,PV1 SP1 MODE	LOW		P1491,PV4 SP1 MODE	LOW	
P1192,PV1 SP1 RLY	K1		P1492,PV4 SP1 RLY	K3	
P1193,PV1 SP1 DLY	3		P1493,PV4 SP1 DLY	3	
P1194,PV1 SP2 MODE	HIGH		P1494,PV4 SP2 MODE	HIGH	
P1195,PV1 SP2 RLY	K2		P1495,PV4 SP2 RLY	K4	
P1196,PV1 SP2 DLY	3		P1496,PV4 SP2 DLY	3	
P1197,PV1 SP3 MODE	OFF		P1497,PV4 SP3 MODE	OFF	
P1198,PV1 SP3 RLY	Koff		P1498,PV4 SP3 RLY	Koff	
P1199,PV1 SP3 DLY	3		P1499,PV4 SP3 DLY	3	

Not all parameters are listed.

HARDWARE INSTALLED OPTIONS

PS-2000C-EXP-PROBE ☐ PS-2000C-EXP-RTD ☐ ☐ ☐

S1(Voltage select)		
230/115 V		

J1(120 Ω terminator)		
In/Out		

TECH: _____