

7794 and 7794D Sanitary Durafet[®] II pH Electrode Series Instruction Manual

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About This Document

Abstract

This manual is published solely for the purpose of supporting the 7794 and 7794D Sanitary Durafet II pH Electrode.

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



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Europe	Honeywell PACE, Brussels, Belgium	[32-2] 728-2111
Latin America	Honeywell, Sunrise, Florida U.S.A.	(854) 845-2600

Symbol Definitions

The following table lists those symbols that may be used in this document to denote certain conditions.

Symbol	Definition
	This DANGER symbol indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury .
	This WARNING symbol indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury .
	This CAUTION symbol may be present on Control Product instrumentation and literature. If present on a product, the user must consult the appropriate part of the accompanying product literature for more information.
	This CAUTION symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage .
	WARNING PERSONAL INJURY: Risk of electrical shock. This symbol warns the user of a potential shock hazard where HAZARDOUS LIVE voltages greater than 30 Vrms, 42.4 Vpeak, or 60 Vdc may be accessible. Failure to comply with these instructions could result in death or serious injury.
	ATTENTION, Electrostatic Discharge (ESD) hazards. Observe precautions for handling electrostatic sensitive devices
	Protective Earth (PE) terminal. Provided for connection of the protective earth (green or green/yellow) supply system conductor.
	Functional earth terminal. Used for non-safety purposes such as noise immunity improvement. NOTE: This connection shall be bonded to protective earth at the source of supply in accordance with national local electrical code requirements.
	Earth Ground. Functional earth connection. NOTE: This connection shall be bonded to Protective earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground. Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.
	Earth Ground. Functional earth connection. NOTE: This connection shall be bonded to Protective earth at the source of supply in accordance with national and local electrical code requirements.
	Chassis Ground. Identifies a connection to the chassis or frame of the equipment shall be bonded to Protective Earth at the source of supply in accordance with national and local electrical code requirements.

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1. Introduction

1.1 Description

The Honeywell Sanitary Durafet II pH Electrode Series (Figure 1-1) has been designed to provide accurate pH measurements for the food and dairy industry. It has been “accepted for use in dairy plants surveyed and approved for USDA grading service.” Other government and sanitary approvals are pending.

All models in the Sanitary Durafet II Series feature a patented Ion-Selective Field Effect Transistor (ISFET), which is a solid state pH sensing device. The Sanitary Durafet II electrode measures pH in much the same way as conventional glass electrodes. The virtually unbreakable design allows in-line measurement of pH in the food and dairy industry. This improves productivity, product quality and process control.

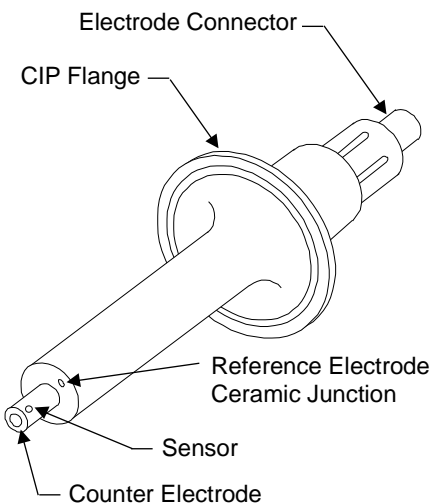


Figure 1-1 Sanitary Durafet II pH Electrode

There are six models in the Sanitary Durafet II Series product line with varying flange sizes and immersion depths (Table 1-1).

Table 1-1 Durafet II pH Electrode Flange Sizes

Model	Flange Diameter	Immersion Depth
51450948-001	1-1/2"	Shallow
51450948-002	1-1/2"	Deep
51450948-003	2"	Shallow
51450948-004	2"	Deep
51450948-005	3"	Shallow
51450948-006	3"	Deep

These six electrodes share a common design. The molded housing is made of polysulfone, a highly corrosion-resistant and FDA compliant high temperature plastic. The housing contains the solid-state pH sensor, an integral reference junction, an automatic temperature compensator, and a counter electrode.

Designed for mounting in standard Clean-In-Place (CIP) fittings, the Sanitary Durafet II Electrode offers exceptional ease of maintenance and servicing. With the variety of available signal conditioning modules and a choice of several cable lengths, this non-glass pH electrode can be readily incorporated into most sanitary pH applications.

1.2 Compatibility

The Sanitary Durafet II Electrode Series can be used with various Honeywell preamplifiers and with Honeywell pH Analyzers and pH analyzers made by other manufacturers. The preamplifier output from the electrode system provides a conventional temperature compensated Nernstian output. The following types of pH Analyzer/Preamplifier combinations can be used.

- 9782P-01 Analyzers with pH input from external preamp or from Cap Adapter.
- 9782P-03 Analyzers with internal Durafet II preamplifier. Direct Durafet II input with connector from cable.
- APT2000PH Transmitter with input from Cap Adapter.
- Honeywell 7082-1□ and -2□ Series pH Analyzers/Controllers. These instruments can accept input from a remote preamplifier.
- Honeywell Model 7082-4□ pH Analyzer/Controller. An internal preamplifier is installed.
- Honeywell analog and microprocessor-based instruments which provide power to and accept input from a remote Durafet II preamplifier.
- pH analyzers manufactured by vendors other than Honeywell, when accompanied by a Honeywell Module. The Adapter Module can be ac powered or battery powered.

1.3 Specifications

1.3.1 Sanitary Durafet II Electrode

Operating Range:

0 pH to 14 pH

Operating Temperature Range:

-10 °C to 110 °C (+14 °F to 230 °F)

Sterilization conditions (non-operating):

130 °C maximum @ 345 KPa maximum (266 °F maximum @ 50 psig maximum)

Maximum Process Pressure:

0 KPa to 690 KPa from -10 °C to 100 °C

0 KPa to 345 KPa from above 100 °C

0 psig to 100 psig from 14 °F to 212 °F

0 psig to 50 psig above 212 °F

Body:

Glass-filled polysulfone. FDA compliant. Ceramic reference junction. ISFET measuring sensor.

Internal Reference:

Silver-silver chloride gel-filled diffusion type

Electrode Length:

See Figure 2-1.

Electrode Weight:

1-1/2": 5.3 oz. (150.2 grams)

2": 5.6 oz. (158.8 grams)

3": 7.0 oz. (198.4 grams)

Temperature Compensation:

Automatic

Connection:

Quick disconnect edge connector (submersible to 50 feet)

Electrode Mounting:

Installs into standard CIP (such as Tri-Clamp®) fittings.

Materials in Contact with Process Solution:

Polysulfone, Viton, high alumina ceramic, silicon

1.3.2 Preamplifier Module 31079288

Housing:

Glass-filled polypropylene, NEMA-4X rated

Connections:

Two 3/4" NPT female

Dimensions:

9 1/8" x 4 3/8" diameter (232 mm x 111.1 mm)

Weight:

2 lb. (0.9 kg)

1.3.3 Adapter Module 31072920 and 31084755

Housing:

Molded fiberglass/stainless steel hardware, NEMA 4X, IP65

Connections:

Two 3/4" conduit holes

Dimensions:

9-1/2" x 7-1/4" x 4" (241 mm x 184 mm x 102 mm)

Power:

31079290: 108-132 Vac, 50-60 Hz, 15 VA

31084755: 208-264 Vac, 50-60 Hz, 15 VA

Weight:

5 lb. (2.3 kg)

2. Installation

2.1 Unpacking

Examine the shipping container before opening. If there are visible signs of damage, do not open the container. Notify the carrier and Honeywell immediately. If there is no external damage, open the container and compare the contents with the packing list. Notify the carrier and Honeywell immediately if there is equipment damage or shortage. Carefully remove the electrode from the shipping carton. Note the general precautions listed below prior to handling.

It is recommended that the soft vinyl protective covers be left in place on the electrode and flange until time of installation to avoid scratching or nicking the electrode surfaces. The cotton packing material inside the cap is saturated with a potassium chloride salt solution which protects the porous reference junction from drying during shipment and storage.

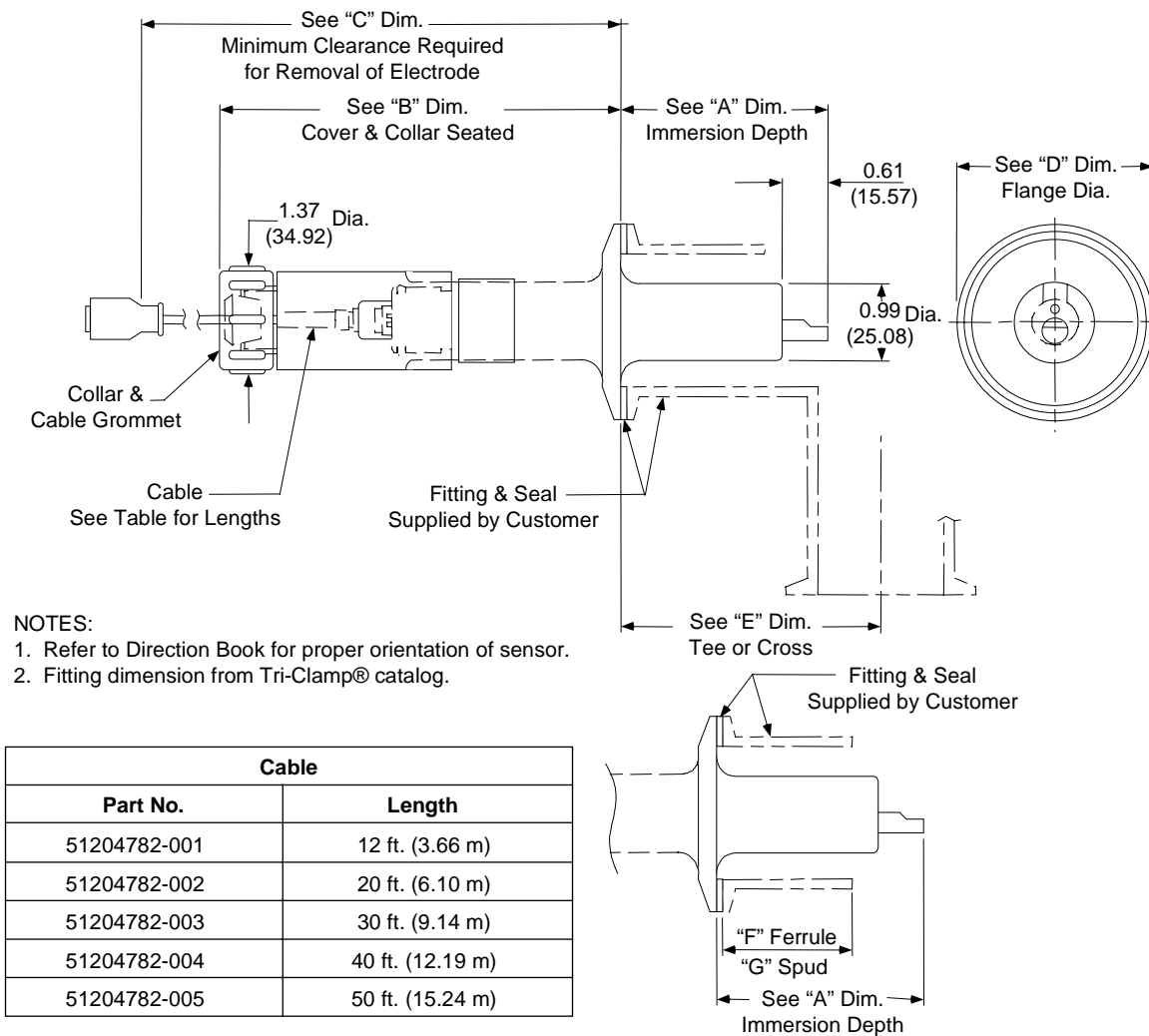
Note the electrical connector which is located above the label on the electrode. Leave the protective cap over the electrical connection end until you are ready to connect the electrode cable. Save the connector cap for protection whenever the electrode cable is disconnected. Any excess salt crystals on the sensor can be removed by placing the electrode under warm tap water until dissolved. Do not wet the electrical connector end.

2.2 General Precautions

- Avoid touching the sensor area. Pressure applied to this area could damage the sensor.
- Avoid contaminating the electrical connector contacts. Contamination can result in electrical leakage paths which affect the accuracy of pH measurements.
- Always replace the protective cap over the sensor when the electrode is not in use. Be sure to reinstall the electrode connector cap whenever the electrode is removed from service. Ensure that the cotton packing in the cap is saturated with potassium chloride solution to prevent the reference junction from drying out. If solution is not available, substitute tap water or buffers of 4.01 pH or 6.86 pH (see “Cleaning” later in this manual).
- Do not expose the electrode to hydrofluoric acid. Be aware that acidified solutions of fluoride salts may form hydrofluoric acid.
- The sensor will have a reduced service life in processes which use high temperatures in combination with alkaline conditions.
- Do not install electrodes where temperatures go below $-10\text{ }^{\circ}\text{C}$ ($+14\text{ }^{\circ}\text{F}$) or freeze damage may result. Observe upper temperature limit specifications ($110\text{ }^{\circ}\text{C}$, $230\text{ }^{\circ}\text{F}$ operating).
- See “Electrode Installation” later in this manual for information on proper positioning of the electrode.
- Promptly remove any water that might inadvertently come in contact with the electrode connector or cable connector. Blow drying with clean low pressure (15 psi) instrument air is a simple and effective means for drying the connector(s).

2.3 Installing the Electrode

Be sure the location of the electrode allows sufficient space for removal. See Figure 2-1.



Part No.	CIP Flange	"A" Dim.	"B" Dim.	"C" Dim.	"D" Dim.	"E" Dim.	"F" Dim.	"G" Dim.
51450948-001	1-1/2"	2.29 (58.14)	6.30 (160.02)	11.01 (279.58)	1.98 (50.39)	2.75 (69.85)	1.63 (41.40)	3.00 (76.20)
51450948-002		2.91 (73.91)	5.68 (144.25)	10.39 (263.80)				
51450948-003	2"	2.83 (71.83)	5.76 (146.33)	10.47 (265.89)	2.52 (63.91)	3.50 (88.90)	1.75 (44.45)	3.00 (76.20)
51450948-004		3.72 (94.46)	4.87 (123.70)	9.58 (243.28)				
51450948-005	3"	2.53 (64.26)	6.06 (153.90)	10.77 (273.46)	3.58 (90.91)	3.75 (95.25)	1.94 (49.20)	4.00 (101.60)
51450948-006		3.72 (94.46)	4.87 (123.70)	9.58 (243.28)				

Figure 2-1 Sanitary Durafet II Electrode Outline and Dimensions

Sanitary Durafet II electrodes are designed for installation with the following Tri-Clamp® (or equivalent) fittings:

- 7MP-1-1/2" Tee
- 7MP-2" Tee
- 7MP-3" Tee
- 14 MPW-1-1/2" Tank Welding Ferrule
- 14 MPW-2" Tank Welding Ferrule
- 14 MPW-3" Tank Welding Ferrule
- 14 WLMP-1-1/2" Tank Welding Spud
- 14 WLMP-2" Tank Welding Spud
- 14 WLMP-3" Tank Welding Spud
- 9 MP-1-1/2" Cross
- 9 MP-2" Cross
- 9 MP-3" Cross

The electrode assembly, as you receive it, has not been sanitized. Prior to installation, you must clean/sanitize the electrode assembly as your process requires.

If the electrode is being installed in a location which uses air-injected CIP (Clean In Place) fittings, make sure that the electrode's maximum pressure/temperature limits are not exceeded. See Specifications.

To maintain electrode/CIP fitting pressure and temperature service ratings, use heavy construction clamp/gasket combination (not supplied by Honeywell). Tri-Clamp series 13 MHHM or 13MHHS with wing nut tightened to 25 inch-lb. torque and Tri-Clamp series 40 MP EPDM, Viton torque and Tri-Clamp series 40MP EPDM, Viton or silicone rubber gaskets meet the requirements.

Owing to the nature of PTFE, it is strongly recommended that you not use this gasket material, as the possibility of leakage and damage to the electrode may occur.

Overtightening of the mounting clamp may damage the electrode.

Install electrode as follows:

1. Remove the soft vinyl protective covers from the electrode and flange.
2. Install the electrode, using a suitable gasket, in the appropriately sized Tri-Clamp® (or equivalent) fitting.

If the application permits, a suitable release agent may be applied to the gasket to aid in later electrode removal.

Because of cleanability considerations, avoid mounting the electrode vertically with the sensor end UP.

Vertical mounting with sensor end DOWN, or horizontal mounting are recommended. If you are installing the electrode in a tee, the electrode should be installed in one end of the "run", rather than the "branch". The product flow inlet should be in through the other end of the "run" and exit should be out through the branch (Figure 2-2).

If you cannot avoid mounting the electrode in the branch of a tee, make sure the sensor is turned to face the oncoming process flow. However, if the process is abrasive (contains hard particulate matter), then rotate the electrode to turn the sensor to face away from the oncoming process flow.

NOTICE

The sensor is aligned with the Honeywell logo on the electrode body (Figure 2-3). When the electrode is in its mounting, look at the position of the logo to determine the orientation of the electrode.

To remove the electrode, see Section 0.

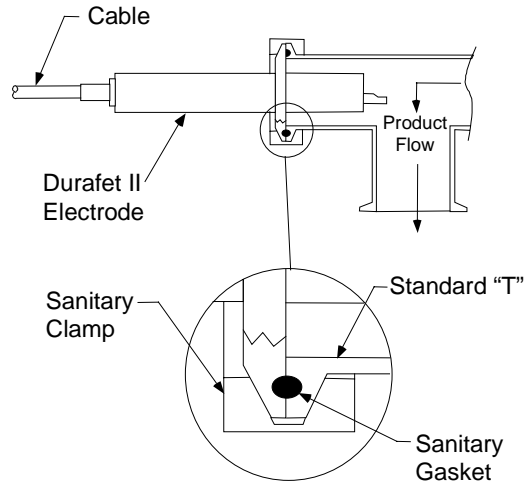
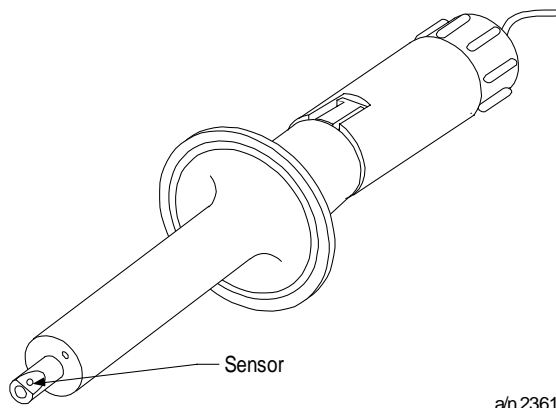


Figure 2-2 Electrode Installation in Tee



a/n 23614

Figure 2-3 Sensor Location

2.4 Preamplifier and Interface Module Installation

In general, the preamplifier or interface module must be located within 50 feet of the electrode installation site. Electrode output cables of 12, 20, 30, 40 and 50 feet are available. See Section 3.3 for a list of electrode cables and part numbers.

2.4.1 31079288 Preamplifier Module

This preamplifier module is used to connect the Sanitary Durafet II electrode to various Honeywell pH Analyzers and transmitters.

This assembly (Figure 2-4) consists of a Honeywell 31079236 preamplifier assembly mounted in a reinforced polypropylene NEMA4X/NEMA6 housing with EPM seals. A mounting bracket and a 20-foot, 6-conductor pre-amp output cable for connection of the pre-amp to the analyzer are also included.

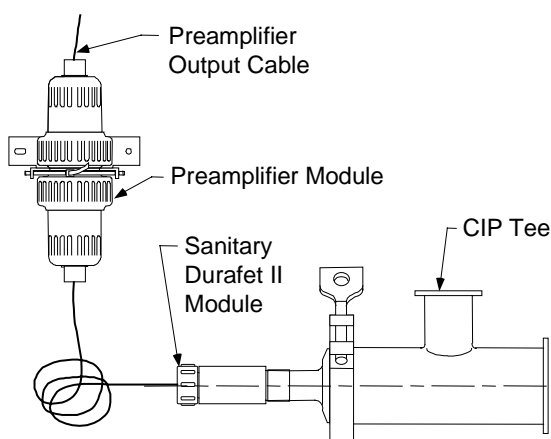


Figure 2-4 31079288 Preamplifier Module

Install the preamplifier module as follows:

1. Mount the module as shown in Figure 2-5.
2. Connect the cables to the electrode and the pH instrument as shown in Figure 2-6.
3. Coil excess electrode cable within the preamplifier module. Do not push excess cable into pipes, pipe coupling or conduits. The preamplifier output cable can be shortened as required.

The alternate reference electrode connection on the preamplifier (Figure 2-5) is not used in the application.

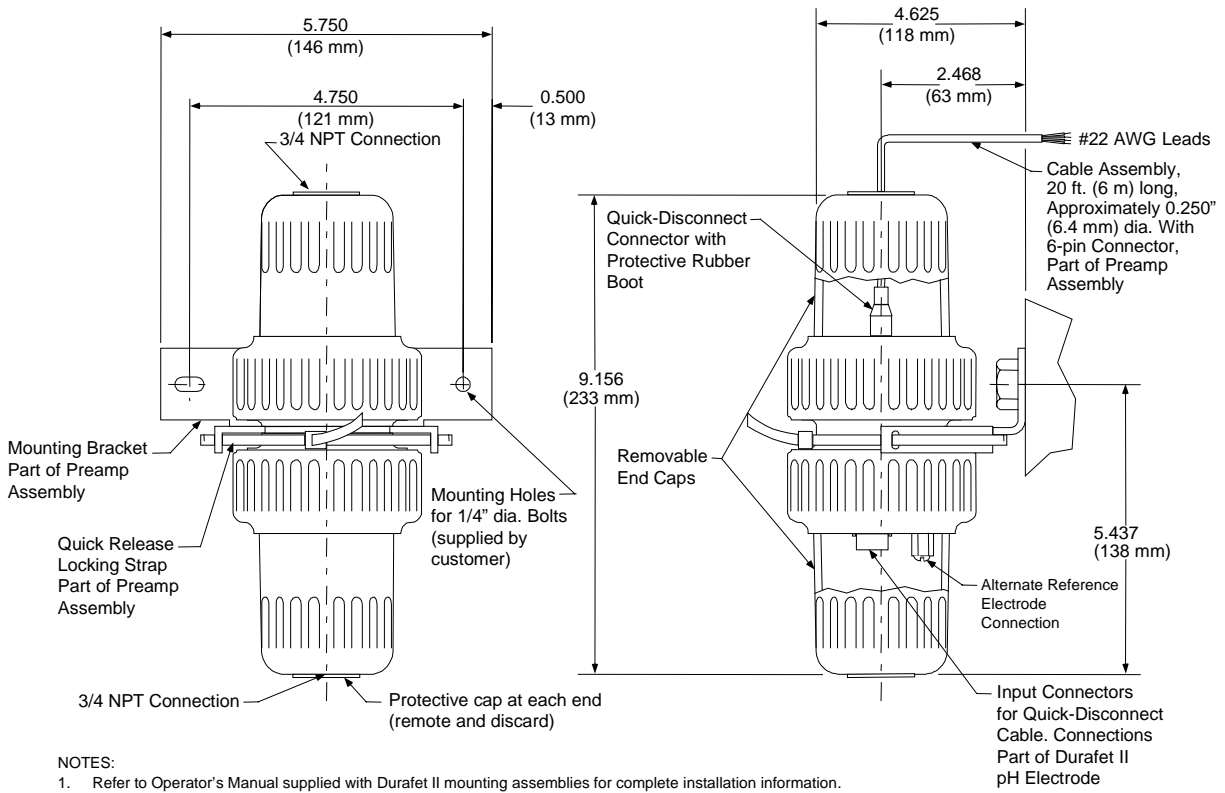
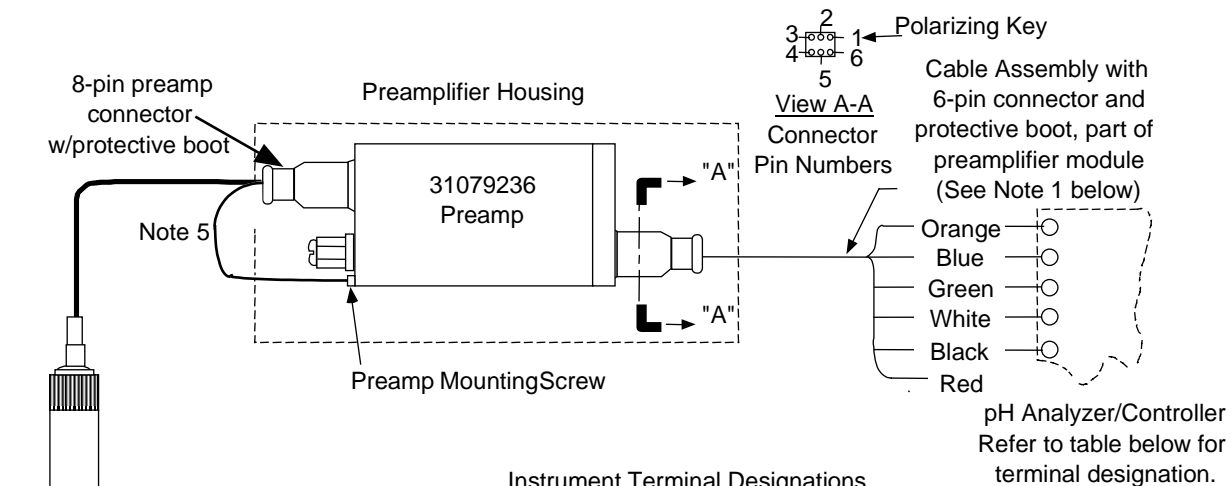


Figure 2-5 31079288 Preamplifier Module Outline and Dimensions



Instrument Terminal Designations

Conn. Pin No.	Wire Color	Instrument			
		-10 -11 *Cat. 7082-12 -20 and 9782 -21	Cat. 7084- <input type="checkbox"/>	Cat. 7075-3 Cat. 7076-3	Cat. 7079-11
1	Orange	PA	16	TA	TA
2	Blue	V+	13	+16V	+5V
3	Green	V-	14	-16V	-5V
4	White	SC	17	SC	SC
5	Black	SC (Notes 2 & 4)	18 (Notes 3 & 4)	PC	PC
6	Red	Not Used	Not Used	Not Used	Not Used

Notes:

- When distance from preamplifier module to instrument is greater than 20 feet, longer preamp-to-instrument cables are available to 200 feet. These cables are:
 51309677-001 50 feet
 51309677-002 100 feet
 51309677-003 200 feet
 When distance from preamplifier module to instrument is greater than 200 feet, use 6-conductor #22 AWG cable (P/N 834088 or equivalent and junction box (P/N 316230).
 - Connect 31233300 resistor (8550 ohms) between terminals "TH" and "SC" of Cat. 7082 or 9782.
 - Connect 31233300 resistor (8550 ohms) between terminals "15" and "18" of Cat. 7084.
 - A 31233300 resistor is supplied loose with every preamp.
 - Connect yellow shield wire on the electrode cable to the preamp mounting screw adjacent to standoff connector.
- *If 9782 utilizes an internal preamplifier kit, follow directions in manual supplied with kit.

Figure 2-6 31079288 Preamplifier Module Wiring Diagram

High Humidity and Condensation Installations

The 31079288 preamplifier is suitable as shipped for installations where relative humidity conditions are 85-90 %, non-condensing. If condensation occurs, it is possible for water to accumulate in the connectors, causing erratic performance and damage to the connectors. This must be prevented. The use of silicone grease provides protection for the Durafet II electrode connectors in installations where condensation might occur.

NOTICE

It is important to keep foreign material out of the connectors after applying any silicone grease. Handle all treated parts with care. Before applying silicone grease, be sure that the connectors are clean and dry.

Use Honeywell part number 31090011, a 0.3-oz. tube of high vacuum silicone grease. Dow Corning high vacuum silicone grease or Dow Corning #4 silicone electrical insulating compound may also be used. Apply grease as follows:

1. Hold the opened end of the silicone grease tube against the pins of one of the two male connectors of the preamplifier and carefully squeeze enough grease into the connector to slightly overfill it.

Repeat this procedure for the second male connector. Make sure it is completely filled.

2. Hold the tube tightly against one of the rectangular female cable connectors and squeeze grease in through the small openings until it is forced out of the small slots in the sides of the connector body. Repeat this process over the rest of the face of the female connector.

Before filling, gold-plated connector contacts will be visible through these slots. By filling these spaces with silicone grease, you prevent the accumulation of condensed water in these spaces.

Repeat this procedure on the second rectangular cable. Do not apply grease to the circular connector. The circular electrode connection contains a gasket to prevent water intrusion.

3. Firmly insert the cable plugs into their mating sockets on the preamplifier. Press firmly for full insertion and hold for several seconds to allow excess silicone grease and entrapped air to escape. Wipe all excess grease from the external surfaces of the assembly.

If connectors that have been protected with silicone grease are disconnected, they must be protected from dirt and dust. A small additional application of grease is recommended before they are reconnected. If there is any uncertainty about cleanliness, we suggest that the connectors be thoroughly blown clean with compressed air or inert gas that is water and oil free. Then apply a new coating of silicone grease as described above.

2.4.2 Catalog 7082-4□ pH Analyzer Controller

The preamplifier is already installed in the Analyzer. Simply plug the electrode cable directly into the preamplifier.

2.4.3 31079290/31084755 AC-Powered Interface Modules and 31075773 Battery-Powered Interface Module

The Interface Module is used to connect the Sanitary Durafet II electrode to non-Honeywell pH Analyzers. This adapter module includes the preamplifier and an integral power supply (120 Vac for 31079290 and 240 Vac for 31084755). It is housed in a NEMA4X fiberglass-reinforced plastic case.

The output of this module is equivalent to the output of a glass pH electrode/reference electrode system which has been temperature compensated to a reference temperature of 25 °C. Refer to manual 70-82-25-13 for ac-powered module and to manual 70-82-25-65 for battery-powered modules.

2.5 Connecting a Cap Adapter to an Instrument

2.5.1 Cap Adapter

The Cap Adapter is an integral part of the electrode cable. It is essentially a preamplifier that does not require separate mounting. The output from the Cap Adapter can be connected directly to a pH instrument. The Cap Adapter and cable for Durafet II electrodes are available in lengths of 4 feet, 8 feet, 12 feet, 20 feet, and 50 feet. One end of the Cap Adapter cable is the mating connector to the edge connector of the Durafet II electrode. The other end of the cable terminates with tinned leads. The tinned leads connect to the input terminals of the pH instrument as described below.

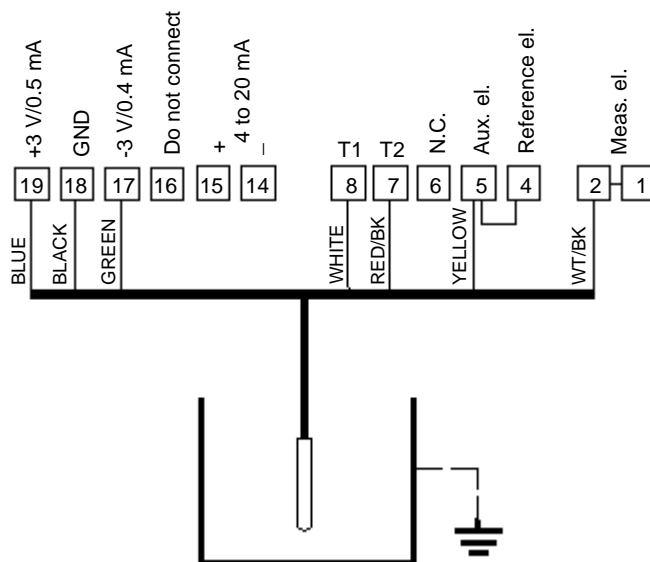
2.5.2 Connection to a 9782 pH Analyzer

The Cap Adapter is connected to a 9782P-01 analyzer. (See *9782 Instruction Manual* for more detailed description of the 9782.) Connect the tinned leads of the Cap Adapter cable as follows:

Wire Color	9782 Terminal
Orange	PA
Blue	V+
Green	V-
White	SC
Black	SC
Red	TH
Yellow	Ground Screw
White/Black	Not Used
Red/Black	TH

2.5.3 Connection to an APT2000 pH Transmitter

The Cap Adapter can be connected to the APT2000 pH Transmitter. (See the APT2000 pH Transmitter Manual, part number 70-82-25-92, for more detailed description of the APT2000.)



NOTE:

Orange and Red wires are not typically connected. These should be clipped and electrically sealed to avoid possible contact with other conductors.

Figure 2-7 Connecting to an APT2000 pH Transmitter

2.6 Installing the Cable (Non-Cap Adapter Cables)

The cable connecting the Durafet II electrode and preamplifier (Figure 2-6) has an edge connector on one end and a rectangular plastic 8-pin keyed push-on connector on the other end. The edge connector mates with the Sanitary Durafet II electrode. The rectangular 8-pin connector mates with the input side of the preamplifier (external or internal type).

In general, the preamplifier end of the electrode output cable should be installed first. This allows the electrode end of the cable to be fed through a cable grip fitting, which you should install on the Analyzer case, 31079288 Preamplifier Module, or Industrial Adapter Module case. The preamplifier end of the cable will not fit through the cable grip.

CAUTION

Do not allow liquids or other foreign matter to contact the cable connectors. Leave the protective cap in place on the connector when the cable is not installed on an electrode. Save the cap for protection whenever the cable is disconnected from the electrode.

Connectors are constructed with high resistance insulating material which can be contaminated if exposed to oil and salts from bare hands. Avoid contaminating the internal area of the connectors. Also make sure that the mating half of the connector, located on the input side of the preamplifier (inside the plastic housing) is kept clean and dry.

These areas may be cleaned by spraying with TF grade Freon or by wiping clean with a cotton swab moistened with isopropyl or grain alcohol. Allow connectors to dry completely before making connections.

Install the cable as follows:

1. To attach the connector to the electrode, align the key and keyway, then push the cable plug firmly into the electrode receptacle.
2. Tighten the plastic shell of the connector firmly onto the electrode to assure good contact and sealing. Be careful not to cross the threads on the connector. Hand tighten only.
3. Make sure the cable's rectangular connector is plugged into the receptacle on the preamplifier. The rectangular connector contains a polarizing key for proper orientation. Do not force it on.

2.7 Electrode Removal

Before removing an electrode from a process, make sure the line in which it is installed has been emptied and that process pressure has been reduced to atmospheric pressure before removing the clamp.

Remove the electrode as follows:

1. Unscrew and disconnect the cable connector and place the protective cap on the electrode receptacle and the white vinyl protective cap on the cable plug. (See Section 3.3 in this manual to reorder these caps, if necessary.)
2. Remove the CIP clamp. Then grasp the back end of the electrode close to the flange, and gently rock it back and forth to separate it from the gasket. If the gasket sticks, allow 4 to 5 minutes for it to relax, then try again. Do not strike the electrode or flange with a hammer/mallet, etc., and do not pull the electrode sharply to the side, as these actions can damage the unit. The gasket is more likely to stick after the joint has been heated and cooled.

If the application permits, a suitable release agent may be applied to the gasket when it is installed to help in later removal.

2.8 Calibration

For best results, the Sanitary Durafet II Electrode should be calibrated at regular intervals, determined by experience for the particular process. Refer to the instruction manual of the pH Analyzer you are using for calibration procedures.

3. Maintenance

3.1 Shelf Life and Storage

Periodic maintenance is required to ensure that the electrode does not dry out after prolonged shelf storage. Stored electrodes should be checked (by removing cap) once per year to ensure that the cotton packing is still wet.

For stored electrodes, perform the following procedures once per year:

1. Remove the electrode from its storage box and pull the vinyl cap from the sensing end.
2. Remove any excess crystals on the sensor area by rinsing with warm tap water.
3. Refill the cap with electrode storage solution (see “Precautions” in this manual).
4. Replace the cap on the electrode.
5. Place electrode back in its storage box. Mark the date on the box.

NOTICE

Do not store electrode at or below $-10\text{ }^{\circ}\text{C}$ ($+14\text{ }^{\circ}\text{F}$) or above $50\text{ }^{\circ}\text{C}$ ($122\text{ }^{\circ}\text{F}$).

3.2 Cleaning

How often the electrode needs to be removed for cleaning depends on process conditions. Some process materials tend to adhere to the sensor and could interfere with the accuracy or time response of measurements. If it becomes necessary to remove the electrode for cleaning, proceed as follows:

1. Remove the electrode from service and disconnect the cable from the electrode.
2. Place the electrode under flowing warm tap water to remove any loose or lodged debris.
3. Remove oil deposits with a household detergent (Joy or Windex) or a laboratory detergent (Micro or Sparkleen).
4. Clean the electrode body with almost any commercial cleaning agent.
5. To clean mineral scaling from the sensor, use dilute hydrochloric acid or other dilute acid. After cleaning, rinse thoroughly in distilled water. Allow it to soak for an hour in a neutral buffer such as 6.86 pH buffer, Honeywell part number 31103002. Wipe the sensor area gently with soft wet cotton swab.

If the reference electrode junction is clogged or dirty, remove the storage cap from the electrode (if necessary) and immerse the end of the electrode for one hour in tap water at approximately $90\text{ }^{\circ}\text{C}$. If this does not fully unclog the reference electrode junction, perform the following:

1. Place the electrode in a beaker of saturated potassium chloride (KCl) solution and heat to boiling.
2. Remove from heat and let the electrode soak in this solution until it cools to room temperature.

3.3 Replacement Parts

Replacement Parts are listed in Table 3-1.

Table 3-1 Replacement Parts

Description	Part No.
Electrode Storage Cap	31086225
1-1/2" Flange Protector	31086266
2" Flange Protector	31086267
3" Flange Protector	31086268
Standard Buffer Reference Solution (1 Pint)	
4.01 pH	31103001
6.86 pH	31103002
9.18 pH	31103003
Connection Cable	
(Durafet II Electrode to Preamplifier Module)	
12 foot length	51204782-001
20 foot length	51204782-002
30 foot length	51204782-003
40 foot length	51204782-004
50 foot length	51204782-005
Cap Adapter Cables	
(Direct Connection 9782P or APT2000PH)	
4 foot length	51205965-006
8 foot length	51205965-007
12 foot length	51205965-001
20 foot length	51205965-002
50 foot length	51205965-005

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