

## **7777 Immersion/In-Line Mounting for Meredian<sup>®</sup> II pH/ORP Electrodes Installation and Maintenance Manual**

70-82-25-05

Rev. 1

3/08

---

# Copyright, Notices, and Trademarks

Printed in U.S.A. – © Copyright 2008 by Honeywell

Revision 1 – March 2008

## WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Contact your local sales office for warranty information. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace without charge those items it finds defective. The foregoing is Buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

**Honeywell Process Solutions**  
512 Virginia Drive  
Fort Washington, PA 19034

Meridian II is a trademark of Honeywell

Hastelloy is a trademark of Haynes International, Inc

Teflon is a trademark of E. I. DuPont De Nemours & Company, Inc.

Other brand or product names are trademarks of their respective owners.

# About This Document

## Abstract

This manual provides in-line installation instructions for Meredian® II pH/ORP Electrodes.

## Contacts

### World Wide Web

The following lists Honeywell's World Wide Web sites that will be of interest to our customers.

Honeywell Organization	WWW Address (URL)
Corporate	<a href="http://www.honeywell.com">http://www.honeywell.com</a>
Industrial Measurement and Control	<a href="http://www.honeywell.com/imc">http://www.honeywell.com/imc</a>
Technical Tips	<a href="http://content.honeywell.com/ipc/faq">http://content.honeywell.com/ipc/faq</a>

### Telephone








Contact us by telephone at the numbers listed below.

Organization		Phone Number	
United States and Canada	Honeywell	1-800-423-9883	Tech. Support
		1-800-525-7439	Service

---

## Symbol Definitions

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

Symbol	Definition
	This CAUTION symbol on the equipment refers the user to the Product Manual for additional information. This symbol appears next to required information in the manual.
	<b>WARNING</b> <b>PERSONAL INJURY:</b> 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. <b>Failure to comply with these instructions could result in death or serious injury.</b>
	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.

---

# Contents

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Overview .....	1
1.2	About This Manual.....	1
<b>2.</b>	<b>SPECIFICATIONS.....</b>	<b>3</b>
2.1	Physical .....	3
2.2	Classification .....	3
2.3	Pressure and Temperature Limits .....	3
2.4	Model Selection Guide.....	4
<b>3.</b>	<b>GENERAL ASSEMBLY INSTRUCTIONS .....</b>	<b>5</b>
3.1	Selecting Materials of Construction .....	5
3.2	Selecting between the Quick Disconnect and Integral Cable option.....	5
	Overview.....	5
3.3	Sealing Pipe Joints.....	5
3.4	Meridian II Electrode Preparation .....	6
3.5	Preamplifier Module Preparation .....	6
3.6	Overview of Assembly .....	7
3.7	Pressure Test.....	9
3.8	Final Electrical Connections.....	10
<b>4.</b>	<b>IMMERSION MOUNTING .....</b>	<b>13</b>
4.1	General Information .....	13
4.2	Preamplifier Module mounted on Submersion Pipe.....	15
4.3	Preamplifier Module Remote Mounted.....	17
4.4	With Junction Box (ORP only) .....	19
4.5	Direct Electrode to Instrument Connection (pH or ORP) .....	22
<b>5.</b>	<b>IN-LINE MOUNTING .....</b>	<b>25</b>
5.1	General Information .....	25
5.2	Preamplifier Module Remotely Mounted.....	27
5.3	Direct Electrode to Instrument Mounted .....	29
<b>6.</b>	<b>ELECTRICAL CONNECTIONS.....</b>	<b>31</b>
6.1	Electrical Connections for Electrodes with Integral Cable.....	31
6.2	Electrical Connections for Electrodes with Quick Disconnect Cable Option .....	34

---

<b>7.</b>	<b>MAINTENANCE, STANDARDIZATION, AND REPLACEMENT PARTS.....</b>	<b>36</b>
7.1	Maintenance .....	36
7.2	Standardization .....	36
7.3	Replacement and Accessory Parts.....	37
<b>8.</b>	<b>APPENDIX A – DIMENSION DRAWINGS.....</b>	<b>38</b>
8.1	Remote Mounting with Preamplifier.....	38
8.2	Remote Mounting – Direct instrument connection (pH/ORP) or connection to Junction Box (ORP only).....	39
8.3	In-line Mounting with Preamplifier.....	40

## Tables

Table 3-1	Installation Tasks for Submersed Electrode	8
Table 3-2	Installation Tasks for In-Line Electrode	9
Table 3-3	Instructions for Pressure Test	9

## Figures

Figure 3-1	Outline and Dimensions Drawing for 31316260	11
Figure 4-1	Suggested Support Arrangements	14
Figure 4-2	Preamplifier not submersed	16
Figure 4-3	Preamplifier Module, Remotely Mounted	18
Figure 4-4	ORP Electrode with Junction Box	21
Figure 4-5	Direct Electrode to Instrument Connection	23
Figure 5-1	Proper Mounting Angle for Electrode	26
Figure 5-2	In-Line Mounting of Electrode with Remotely Mounted Preamplifier Module	28
Figure 5-3	In-Line Mounting of Electrode with Direct Connection to Instrument	30
Figure 6-1	Direct to UDA2182 for Glass Meredian (pH)	31
Figure 6-2	Direct to UDA2182 for ORP	31
Figure 6-3	pH Input from External Preamplifier/Cap Adapter to UDA2182	32
Figure 6-4	Direct to APT2000 for Glass Meredian (pH)	32
Figure 6-5	Direct to APT4000 for Glass Meredian (pH)	33
Figure 6-6	Direct to UDA2182 for Glass Meredian (pH) with Quick Disconnect	34
Figure 6-7	Direct to UDA2182 for Glass Meredian (ORP) with Quick Disconnect	34
Figure 6-8	Direct to APT2000 for Glass Meredian (pH) with Quick Disconnect	35
Figure 6-9	Direct to APT4000 for Glass Meredian (pH) with ORP	35
Figure 8-1	Remote Mounting with Preamplifier	38
Figure 8-2	Remote Mounting – Direct instrument connection (pH/ORP) or connection to Junction Box (ORP only)	39
Figure 8-3	In-line Mounting with Preamplifier	40





# 1. Introduction

## 1.1 Overview

The 7777 Series of electrode mountings enables a user to interface a Meredian® II pH/ORP electrode to a process by either submersing the electrode or mounting it into a 3/4" threaded connection.

The Meredian II pH electrodes offer a reliable combination of measuring and reference electrodes together with an integral automatic temperature compensator in a 1-piece corrosion-resistant molded Rytan body. Quick disconnect connectors and cable enable easier installation and maintenance than with any other electrode available. The compact Meredian II electrodes with 3/4" NPT male connections are easily adapted for in-line mounting without O-rings or special seals. Meredian II is also available in Immersion mounting.

The large surface area of the reference junction resists fouling and maintains reliable low-impedance contact with the process solution. The reference junction's symmetrical annular shape surrounding the measuring element minimizes the effects of electrical current passing through the process solution. This offers a significant improvement when compared with unsymmetrical electrode designs that develop large offset potentials and prohibit pH measurements in applications such as electroplating tanks or electrolytic cells.

*Meridian II* electrodes offer glass compositions that provide low sodium error as well as optimum durability at operating temperatures. Long term accuracy and performance are assured. Meredian II electrodes include a permanent reference junction and gel fill for maintenance-free operation. The internal automatic temperature compensator is compatible with both analog and microprocessor-based Honeywell instruments, when used with the appropriate preamplifier.

## 1.2 About This Manual

### Manual part of a set

This manual is part of a set documenting installation and use of the 7777 Meredian® II pH/ORP Electrodes.

The set consists of the following manuals.

- This manual
- Instruction Manual 70-82-25-56 Meredian Combination Industrial Electrode for pH and ORP
- Instruction Manual 70-82-25-57 is provided if preamplifier module is specified in the 7777 catalog number (Table I = 3)
- Instruction manual for the pH/ORP instrument.

### What this manual contains

This manual contains instructions for the immersion and in-line mounting of the 7777 electrodes. It also contains general descriptions of the electrodes and the optional preamplifier modules. **More detailed information about installation, use, and maintenance of the electrodes and preamplifier adapter modules is provided in the other manuals in the set.**

### CAUTION

Read the electrode and preamplifier adapter module manuals before installing and using the Meredian II electrodes. Failure to follow the installation instructions could result in damage to the equipment.



---

## 2. Specifications

### 2.1 Physical

#### Materials in contact with process solution

**Electrode:** Ryton body, glass electrode, ethylene propylene monomer (EPM) seal, ceramic junction,

**Preamplifier:** Glass-filled polypropylene housing, EPM seals.

#### Dimensions

**Electrode Models:** 2.5 cm (1 in.) diameter, 15.2 cm (6 in.) long

**Preamplifier:** See manual supplied with preamplifier

**Junction Box:** See Figure 3-1.

**Immersion/In-Line Mounting:** See Appendix A

### 2.2 Classification

#### FM

Factory Mutual (FM) approved Intrinsically Safe for Class I, Division I, Groups A, b, c, and D Hazardous Areas when used with APT2000 series.

#### NEMA

Preamplifier Modules have a NEMA 4X, NEMA 6 enclosure.

#### CRN

Manufactured to comply with ASME Boiler and Pressure vessel code, Section III, Div I, UG-101.

### 2.3 Pressure and Temperature Limits

#### Temperature

**Electrodes:** -5 to 110°C (23 °F to 230 °F), depending on catalog number. See manual supplied with the electrodes.

**Preamplifier Module:** Upper Temperature Limits are:  
31075705 (for use with microprocessor-based analyzers) : 85 °C (185 °F)

#### Pressure

344.8 kPa @ 100°C (50 psig @ 212 °F)

689.5 kPa @ 50°C (100 psig @ 122 °F)

## 2.4 Model Selection Guide

### Instructions

- Select the desired Key Number. The arrow to the right marks the selection available.
- Make one selection each per table using the column below the proper arrow.
- A dot (•) denotes unrestricted availability.



KEY NUMBER	Description	Selection	Availability
7777	Electrode Mounting	07777	↓

TABLE I - Preamp (depends on analyzer or transmitter used)

Instrument	Preamp Module		
UDA2182 APT2000/4000	None pH (direct electrode to instrument connection)	0	•
UDA2182, APT2000/4000	ORP (direct electrode to instrument connection)		
UDA2182 (Preamp Input)	31075705 Meredian II glass electrode preamp module (includes 31075707 preamp and 31075723, 20 foot (6,10 meters) quick disconnect cable for connection to instrument or junction box) (Note 1)	3	•

TABLE II - Mounting, Leads, Instrument Connection, Part No.

Mounting	Leads (Integral)	Instrument Connection	P/N	Selection	
In-Line	Quick Disconnect (Note 3)	Direct Connection to: UDA2182, APT2000/4000	50027820-001	09	c
Immersion	20' Tinned (6,10 meters)	Direct Connection to: UDA2182, APT2000/4000	51451326-003	16	c
In-Line			51451326-004	18	c
Immersion	12' (6 pin preamp connector) (3,66 meters)	Preamp Connection	31074387	03	d
In-Line			31074399	14	d

### ORP Electrodes:

Mounting	Leads	Temp.	P/N (Note 2)		
In-Line	Quick Disconnect (Note 3)	-5 to 110°C	50027820-002 (gold)	11	c
		-5 to 110°C	50027820-003 (platinum)	12	c
Immersion	20' Tinned (6,10 meters)	-5 to 110°C	51451341-003 (gold)	07	c
		-5 to 110°C	51451340-003 (platinum)	08	c
In-Line	20' Tinned (6,10 meters)	-5 to 110°C	51451341-004 (gold)	27	c
		-5 to 110°C	51451340-004 (platinum)	28	c
		50' Tinned (15,25 meters)	51451340-005 (platinum)	29	c

TABLE III - OPTIONS

Tagging	Linen Customer I.D. Tag (limit to 3 lines, 22 spaces per line)	L	•
	Stainless Steel Customer I.D. Tag (limit to 3 lines, 22 spaces per line)	S	•
Certificate of Calibration	Yes	CC	•

### RESTRICTIONS

Restriction Letter	Table	Available Only With Selection	Table	Not Available With Selection
c	I	0		
d	I	3		

Note 1: For longer preamp to instrument cables, see Accessories and Spare Parts List.

Note 2: Gold is generally used in applications containing cyanide; platinum is used for all others.

Note 3: Please order corresponding Quick Disconnect sensor-to-instrument cable from accessory table.

---

## 3. General Assembly Instructions

### 3.1 Selecting Materials of Construction

#### Preamplifier, electrode, and electrode protector

The materials used in the construction of the preamplifier module, electrode and electrode protector are listed in the specifications. Materials of wetted parts must be compatible with the process temperature and corrosion conditions.

#### User-supplied components

Pipe, pipe couplings, and tees must be supplied by the user. Select materials that are compatible with the process temperature and corrosion conditions.

### 3.2 Selecting between the Quick Disconnect and Integral Cable option

#### Overview

The cable options of quick disconnect and integral cable do not affect the performance of the electrode. These options only relate to how the electrode is connected to the instrument.

There are different electrical connections for these options. Please refer to Section 6 for instructions.

---

#### ATTENTION

The wire colors for the integral cable and quick disconnect option are not the same.

---

#### Integral Cable

Integral cable means that the cable is potted into the electrode. The cable and electrode are one entity and cannot be separated. This configuration can be used in all applications.

#### Quick Disconnect

The quick disconnect option means that the 7777 electrode is connected to the cable by a receptacle on the top of the electrode. The electrode and cable are separate entities.

When the time comes to replace the electrode, the cable does not have to be replaced. That cable can simply be mated with another 7777 electrode which has the quick disconnect option.

The cable must be purchased from Honeywell. The cable length must not exceed 20 feet.

Additionally, electrodes with this option cannot be used in immersion applications. See the Model Selection guide for cable part numbers.

### 3.3 Sealing Pipe Joints

When making pipe joints apply Teflon tape pipe sealant to male threads. Wrap the threads with the tape overlapping by 50% on each wrap. Start the wrap at the end of the pipe and wrap in the direction of the thread at least two turns.

When installing an electrode, apply Teflon tape to the threads, then hand-tighten the electrode in the fitting only until snug. If necessary to stop a leak, a wrench may be applied to the electrode's wrenching flats to further tighten the joint only until the leak has stopped. Always leave at least one thread on the electrode showing outside the fitting.

---

#### CAUTION

When tightening an electrode, never exceed 15 ft-lb applied torque. Applying too much torque can result in damage to the electrode.

---

### 3.4 Meredian II Electrode Preparation

Prepare Meredian II combination electrode as described in the electrode manual supplied. If you want to shorten the integral electrode cable, refer to that manual for instructions.

### 3.5 Preamp Module Preparation

#### When preamplifier is supplied

An external preamplifier module is an option with the 7777 type mounting. The preamp module contains the replaceable preamplifier assembly which is potted and sealed against humidity in a metal can. The preamplifier has quick-disconnects on one end for the Meredian II electrode cable input and on the opposite end for the output cable. Quick-disconnect option is not available for use with the preamplifier.

#### Instructions for preparing preamplifier

Prepare the preamplifier module as described in the manual supplied with the preamplifier.

---

**CAUTION**

Do not over tighten any fitting into the preamp module housing. Damage to the preamplifier end caps may result.

---

#### Selecting location for remotely mounted preamplifier

When the preamplifier module is to be remotely mounted, it should be located within a convenient distance of the electrode. Allow enough slack between the electrode and the preamp to allow for removal of the electrode for maintenance. The cable from the electrode to the preamp module should be secured against continuous flexing. Continuous motion of the cable can build a charge between the outer and inner conductors of the coax cable which would produce an erratic reading.

#### Preamp designed for surface mounting

The module is designed for surface mounting. (Dimensions required for mounting the module are provided in the manual supplied with the preamplifier) A mounting bracket constructed of nickel-plated steel and a plastic, quick release locking strap are provided to facilitate mounting. The module may be mounted in any convenient position in addition to the vertical mounting shown in the preamp manual.

---

**CAUTION**

Do not mount the module where the temperature will be outside the range shown in the specifications. Do not mount the module over or near sources of corrosive vapors that could enter the preamp module during installation or maintenance. Damage to the equipment may result.

---

#### Sealing electrical connections to the preamplifier

All electrical connections to the preamp must be completed and the  $\frac{3}{4}$  inch NPT connections sealed before exposing the unit to corrosive or wet conditions. Before installing the cabling, remove the grommets from the cable grips and cut one side along the axis so that the grommet can be spread to permit cable insertion.

## 3.6 Overview of Assembly

### Where assembly instructions are provided

An overview of the order of assembly is in this section.

Instructions for unpacking, preparing, and maintaining the electrodes are in the manual supplied with the electrodes.

More detailed instructions for connecting the electrode leads directly to the preamplifier module are in the manual supplied with the preamplifier.

Instructions for cabling from the electrode directly to the instrument, or from the preamplifier or junction box to the instrument are provided in this manual.

The recommended configuration for in-line mounting of electrodes is described in Section 5 of this manual.

The recommended configuration for submersed mounting of electrodes is described in Section 4 of this manual.

### Installation tasks

Table 3-1 lists the tasks required to install **submersed** electrodes.

Table 3-2 lists the tasks required for **in-line** mounting of electrodes.

**Table 3-1 Installation Tasks for Submersed Electrode**

Step	Action
1	Read the general information about immersion mounting at the beginning of Section 4.
2	Decide which support arrangement is appropriate for your application.
3	Prepare the support arrangement.
4	Determine which sub-section in section 4 describes your intended installation.
5	Obtain the required materials listed for your installation.
6	Assemble the required pipe and pipe coupling(s) in the arrangement pictured for your installation.
7	Thread the electrode leads through the pipe (if any) that will cover the electrode cable.
8	Connect the electrode cable to the preamplifier or junction box (if used) Instructions for cabling to the preamplifier are provided in the preamp manual. Instructions for cabling to a Junction box are provided in this manual.
9	If a preamplifier module is used, connect the preamplifier output cable to the output side of the preamplifier module as described in the manual supplied with the preamplifier.
10	If a preamplifier module is used, complete assembly and mounting of the preamplifier module as described in the manual supplied with the preamplifier.
11	Perform a pressure test as described in this section.
12	Complete cabling to the instrument (from preamplifier, junction box, or directly from the electrode) as described in this manual and in the preamplifier manual.
13	Mount the unit with the support prepared in step 3.



**Table 3-2 Installation Tasks for In-Line Electrode**

Step	Action
1	Read the general information about in-line mounting at the beginning of Section 5.
2	Select an appropriate location and install the required pipe tee.
3	Obtain the required materials listed in Section 3.1.
4	Connect the electrode cable to the instrument (as described in the manual supplied with the instrument) or to the remotely mounted preamplifier (as described in the preamp manual).
5	If a preamplifier module is used, connect the preamplifier output cable to the output side of the preamplifier module as described in the manual supplied with the preamplifier.
6	If a preamplifier is used, complete assembly and mounting of the preamplifier module as described in the preamp manual.
7	Insert electrode in pipe tee.
8	Complete cabling to the instrument as described in this manual and in the manual supplied with the preamp.

### 3.7 Pressure Test

#### When to perform the test

Before submersing an assembly, we recommend that a low pressure test be performed to test the various seals made during the assembly operation.

#### How to perform the test

Table 3-3 lists the steps for pressure testing the assembly

**Table 3-3 Instructions for Pressure Test**

Step	Action
1	Double back the cable into the immersion pipe.
2	Connect a source of low pressure air to the immersion pipe. (Approximately 69kPa [10 PSI] will simulate immersion in 6.10 m [20 ft] of water)
3	Immerse the assembly in a shallow tank of water and look for any indication of air bubbles streaming from the assembly.
4	If a preamplifier is included in the assembly, check around the two pipe connections of the preamplifier module and around the two o-ring seals of the preamplifier module connecting rings. Air bubbles indicate a possible leakage point and must be corrected.
5	To seal leaking connections: Use extra Teflon tape on pipe joints. Use silicone grease on o-ring seals. Make the connecting rings on the preamplifier snug.

## 3.8 Final Electrical Connections

### Preamplifier Output Cable

At the end of the immersion pipe opposite the electrode, various arrangements can be made for the electrical connections of the output cable.

- A ¾ inch NPT pipe coupling and a ¾ inch NPT cable grip can be used to secure the cable exit point.
- Another approach would be to attach junction box 31316260 directly to the ¾ inch pipe and terminate preamplifier output cable 31075723 inside the junction box. This is helpful if the pH/ORP analyzer or recorder is at some distance from the electrode mounting. Use Honeywell cable 834088 to make the connection from the junction box to the instrument. Carefully note the conductor colors and assure that connections are made as shown in the manual supplied with the preamplifier.

### Preamplifier conductor signals

If the measuring instrument is within 6.10 m (20ft) of the preamplifier module, output cable 31075723 can be used for final connection.

Check the pH instrument directions for the correct connections before attempting to power up the measuring system. If extension cable is used, carefully note the conductor colors and assure that the connections are made as indicated in the Preamplifier.

---

### CAUTION

Do not remove the blue and green wires (dc voltage supply). If preamplifier is included in the assembly, its circuit will be damaged.

---

### Location of junction box

The 31316260 junction box (See Figure 3-1) can also be wall mounted. In any case, allow sufficient overhead space and cable length to allow easy access and withdrawal of the immersion assembly for cleaning, electrode maintenance or preamplifier replacement.

Figure 3-1 provides dimensions of junction box 31316260.

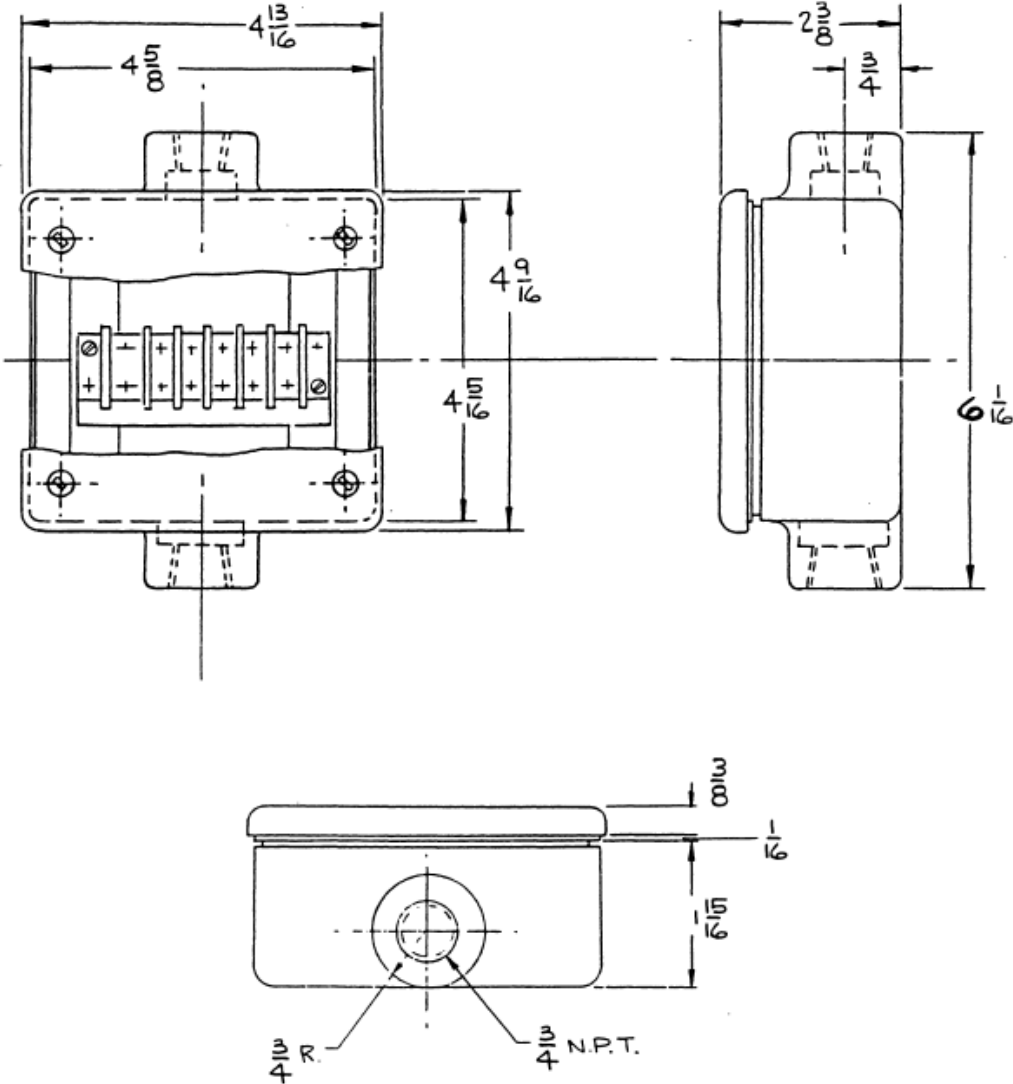


Figure 3-1 Outline and Dimensions Drawing for 31316260



---

## 4. Immersion Mounting

### 4.1 General Information

#### Intended Use

The 7777 Immersion Mounting (Model Selection Guide Table II = 03, 07, 08, 16,) is designed specifically for the Meridian II Combination pH or ORP electrode in any immersion-type industrial measurement in open tanks or pits. It can be used in a variety of configurations to accommodate many techniques for support, immersion, and removal of the electrode or electrode/preamplifier system in a process solution.

A variety of mounting configurations are used according to the process application. By using accessory parts such as pipe, pipe fittings and cable grips, an immersion assembly can be built to suit a specific application.

Figure 4-1 shows some suggested support arrangements.

Figure 4-2 through Figure 4-5 Indicate configurations possible for immersion mounting. Either rigid or flexible connections can be used on either side of the preamplifier module or junction box.

#### Included in assembly

Depending on the catalog number configuration, an assembly may include a Meridian II combination electrode, a preamplifier module or junction box and an electrode protector.

When Table I of the Model Selection Guide is 3, a preamplifier module is provided. It serves as an interface between the pH electrode and the pH instrument. Preamplifier module 31075705 (Table 1 = 3) is used with Honeywell microprocessor-based analyzers/controllers. Refer to the preamplifier manual for connection from the preamplifier to the instrument.

When Table I of the Model Selection Guide is 0, a preamplifier module is not provided because the Meridian II Electrode, in this case equipped with skinned and tinned cable terminal terminations, is wired directly to the pH or ORP instrument. Refer to the directions furnished with those instruments for the proper electrical connections.

#### Minimum Immersion Depth

In all cases, the electrode body should be immersed a minimum of 7.6 cm (3 in.) into the process liquid to ensure proper temperature compensation.

#### Two Basic Measuring systems

Two basic measuring systems are used: one for direct-measuring analyzers designed for a high impedance input directly from the pH or ORP electrode, and a second for a low impedance input from the preamplifier module by which the electrode signal can be transmitted long distances using ordinary cable.

#### Input Signal to Preamplifier

The input to the preamp module is the high impedance, low-level emf from the Meridian II pH electrode mounted in the immersion assembly. Shielded low-loss cable connects the electrode to the preamplifier input. The module output is a low impedance, high-level signal which is easily carried long distances over unshielded cable.

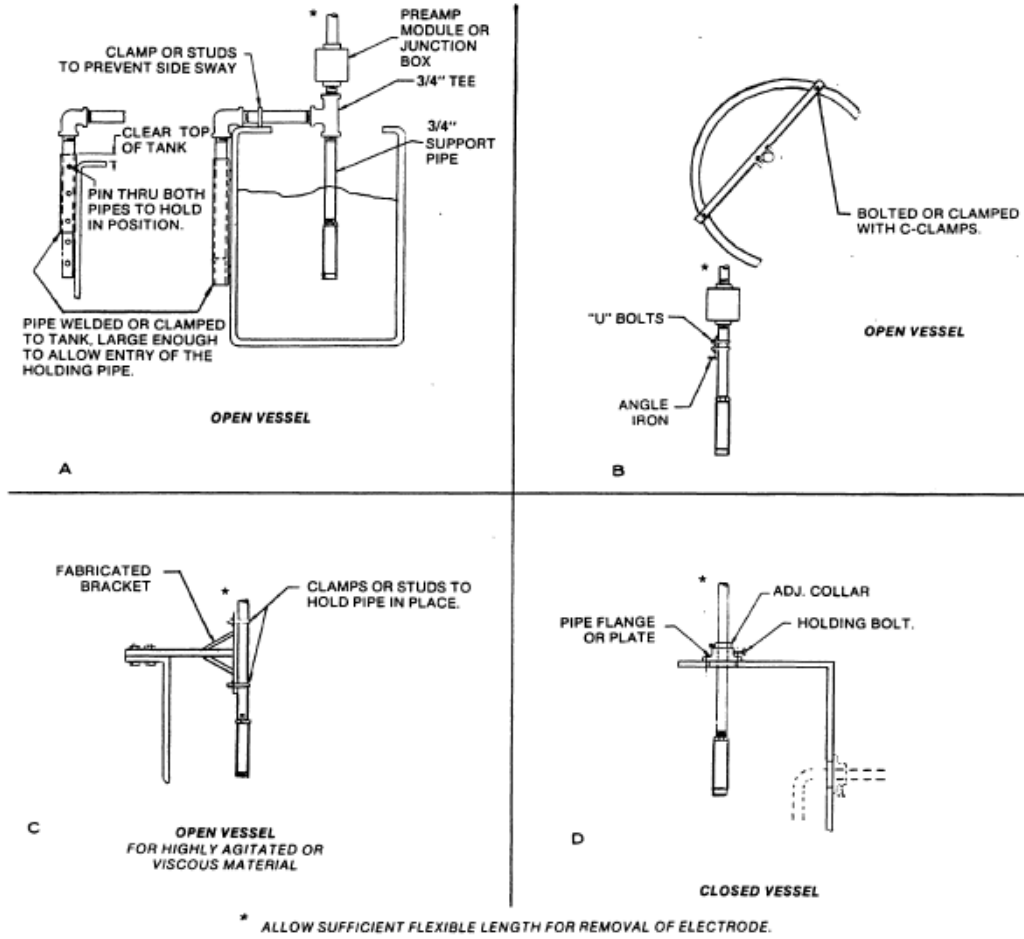


Figure 4-1 Suggested Support Arrangements

## 4.2 Preamplifier Module mounted on Submersion Pipe

### Application

Figure 4-2 illustrates this configuration

### Materials required

The material supplied with this unit is listed below:

Quantity	Item
1	Preamplifier Module
1	Preamp Module Output Cable
1	Meridian II pH Combination Electrode with slotted tip

The material supplied by the customer is listed below:

Quantity	Item
1	Length 3.35 m (20 ft) minimum, 3.51 m (19.5) maximum of $\frac{3}{4}$ in. Schedule 80 plastic pipe threaded on both ends; or $\frac{3}{4}$ in. Schedule 40 metal pipe, threaded on both ends.  Metal pipe is recommended where process flow conditions or stirring would cause the plastic pipe to bend, twist, or vibrate excessively beyond its support point
1	$\frac{3}{4}$ in. NPT pipe coupling
1	$\frac{3}{4}$ in. NPT cable grip for $\frac{1}{4}$ in. diameter cable

### Assembly

See Table 3-1 for order of assembly tasks. Assemble the materials as shown in Figure 4-2.

### Pressure test

Perform a submersible pressure test (see subsection 3.7)

### Final electrical connections

Make final electrical connections (see subsection 3.8)

### Mounting

Mount the assembly. See Figure 4-1 for mounting suggestions.

Figure 4-2 illustrates the configuration of components used for mounting electrode with the preamplifier module not submersed.

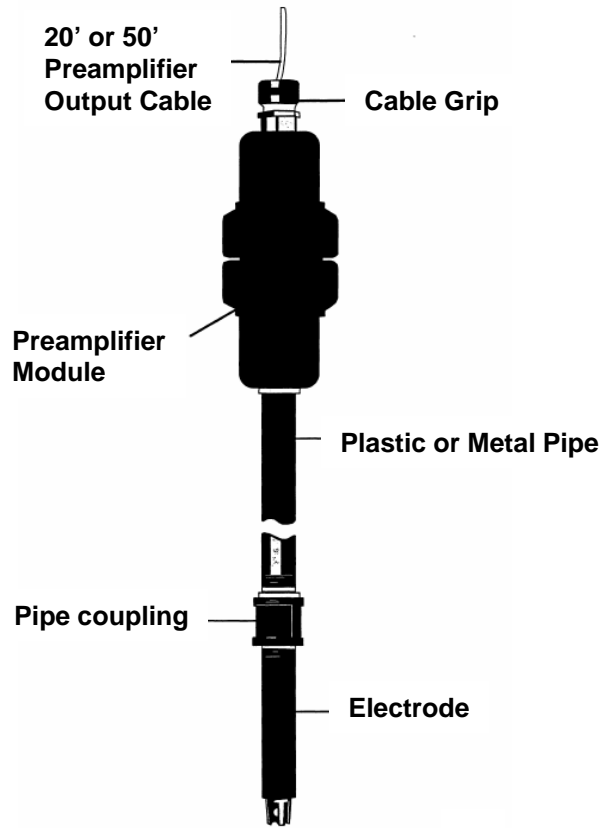


Figure 4-2 Pre-amplifier not submersed



## 4.3 Preamp Module Remote Mounted

### Application

Figure 4-3 illustrates this configuration

### Materials required

The material supplied with this unit is listed below:

Quantity	Item
1	Preamplifier Module
1	Preamp Module Output Cable
1	Meredian II pH Combination Electrode with slotted tip

The material supplied by the customer is listed below:

Quantity	Item
1	<p>¾ in. Schedule 80 plastic pipe threaded on both ends; or ¾ in. Schedule 40 metal pipe, threaded on both ends.</p> <p>Metal pipe is recommended where process flow conditions or stirring would cause the plastic pipe to bend, twist, or vibrate excessively beyond its support point.</p> <p>Pipe length to be determined by user. When planning pipe length, allow enough cable between the pipe and the preamp to permit removal for servicing.</p>
1	¾ in. NPT pipe coupling
1	¾ in. NPT cable grip for ¼ in. diameter cable

### Assembly

See Table 3-1 for order of assembly tasks. Assemble the materials as shown in Figure 4-3.

### Pressure test

Perform a submersible pressure test (see subsection 3.7)

### Final electrical connections

Make final electrical connections (see subsection 3.8)

### Mounting

Mount the assembly. See Figure 4-1 for mounting suggestions.

Figure 4-3 illustrates the configuration of components used for mounting electrode with the preamplifier module remotely mounted.

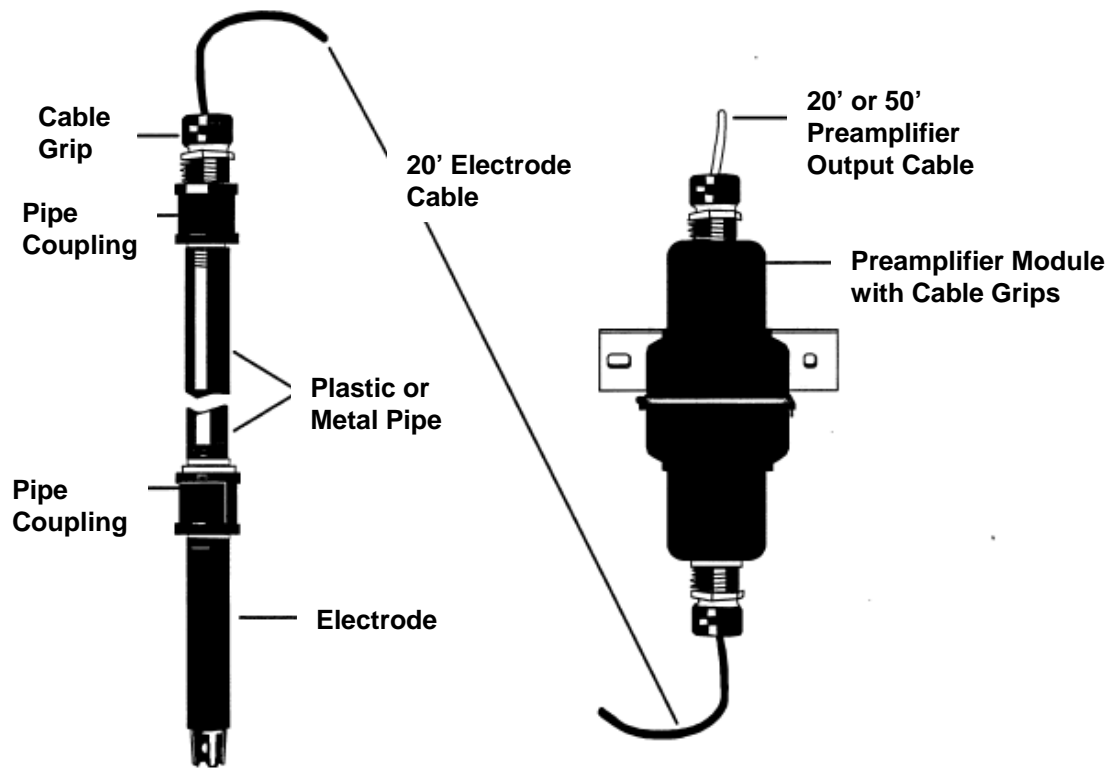


Figure 4-3 Preamplifier Module, Remotely Mounted

## 4.4 With Junction Box (ORP only)

### Application

Figure 4-4 illustrates this configuration.

### Materials required

The material supplied with this unit is listed below:

Quantity	Item
1	31316260 six-terminal Junction Box (order separately)
1	Meredian II ORP Combination Electrode with slotted tip

The material supplied by the customer is listed below:

Quantity	Item
1	Honeywell output extension cable 31835002
1	Length 3.35 m (20 ft) minimum, 3.51 m (19.5) maximum of $\frac{3}{4}$ in. Schedule 80 plastic pipe threaded on both ends or $\frac{3}{4}$ in. Schedule 40 metal pipe, threaded on both ends.  Metal pipe is recommended where process flow conditions or stirring would cause the plastic pipe to bend, twist, or vibrate excessively beyond its support point
1	$\frac{3}{4}$ in. NPT pipe coupling
1	$\frac{3}{4}$ in. NPT cable grip for $\frac{1}{4}$ in. diameter cable

### Assembly

See Table 3-1 for order of assembly tasks. Assemble the materials as shown in Figure 4-4. The 31316260 junction box is used to connect the Meredian II ORP electrode to direct-measuring analyzers located more than 3.66 m (12 ft) from the electrode mounting.

### Location of Junction Box

The junction box may be mounting directly on the immersion pipe as shown in Figure 4-4, or remotely mounted. If the box is remotely mounted, use Figure 4-3 as an example of the immersion assembly.

#### CAUTION

Do not immerse the junction box. If the junction box is immersed, damage to the equipment will result

### Pressure test

Perform a submersible pressure test (see subsection 3.7)

### Connection of electrode cable to junction box

Make final electrical connections (see subsection 3.8). Connect the leads from the electrode cable to the terminal board in the junction box. The leads are identified in the next table.

Lead	Function
Center coax lead	Measuring lead
Orange lead	Reference lead (see note 1)
Pair of white leads (see note 2)	Temperature compensator leads
White lead on center coax (see note 1)	Shield connection (see note 1)

**Note 1:** A separate reference lead is sometimes omitted. In that case, the coaxial shield carries the reference and no shield connection is made at the measuring instrument.

**Note 2:** If the electrode cable has been shortened, two additional white leads have been exposed. These are not used in ORP measurements and may be cut off at the outer cable jacket.

### Connection of Junction Box to measuring instrument

Use Honeywell cable 31835002 to continue the cable run from the junction box to the direct-measuring instrument.

Prepare each end of the cable as instructed in the manual supplied with the electrode. Check the manual supplied with the direct-measuring instrument BEFORE connecting the cable from the junction box to the instrument.

### Mounting

Mount the assembly. See Figure 4-1 for mounting suggestions.

Figure 4-4 illustrates the configuration of components used for mounting electrode with the junction box on the immersion pipe.

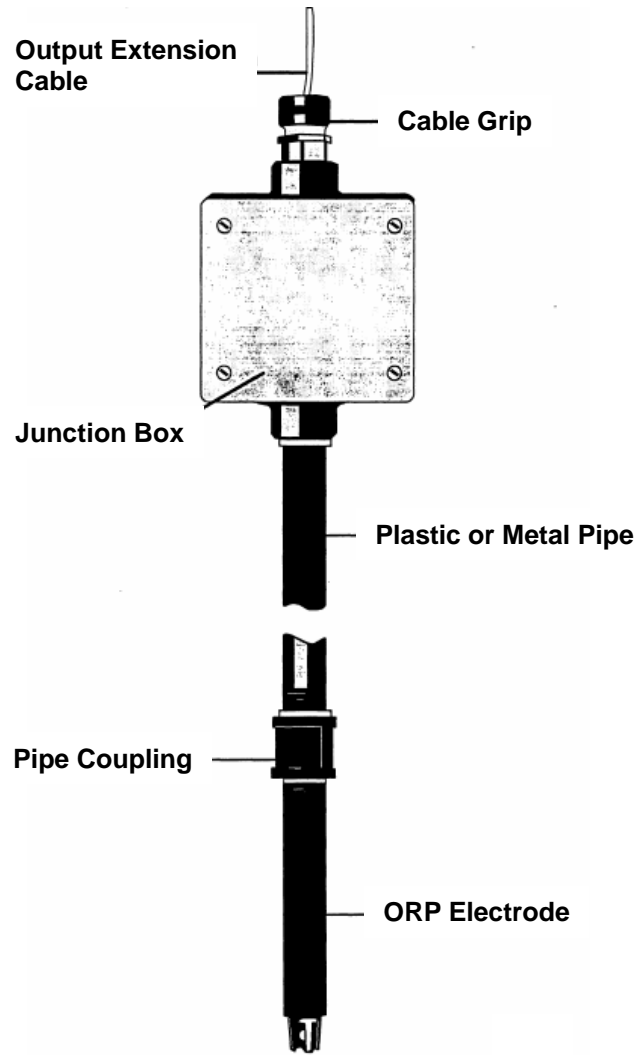


Figure 4-4 ORP Electrode with Junction Box

## 4.5 Direct Electrode to Instrument Connection (pH or ORP)

### Application

Figure 4-5 illustrates this configuration

### Materials required

The material supplied with this unit is listed below:

Quantity	Item
1	Meredian II pH Combination Electrode with slotted tip

The material supplied by the customer is listed below:

Quantity	Item
1	<p>¼ in. Schedule 80 plastic pipe, threaded on both ends; or ¼ in. Schedule 40 metal pipe, threaded on both ends.</p> <p>Metal pipe is recommended where process flow conditions or stirring would cause the plastic pipe to bend, twist, or vibrate excessively beyond its support point</p> <p>Pipe length to be determined by the user. When planning pipe length, allow enough cable between the pipe and instrument to permit removal of electrode for servicing.</p>
1	¼ in. NPT pipe coupling
1	¼ in. NPT cable grip for ¼ in. diameter cable

### Assembly

See Table 3-1 for order of assembly tasks. Assemble the materials as shown in Figure 4-5.

### Pressure test

Perform a submersible pressure test (see subsection 3.7)

### Final electrical connections

Make final electrical connections (see subsection 3.8)

### Mounting

Mount the assembly. See Figure 4-1 for mounting suggestions.

Figure 4-5 illustrates the configuration of components used for directly connecting the electrode to the instrument.

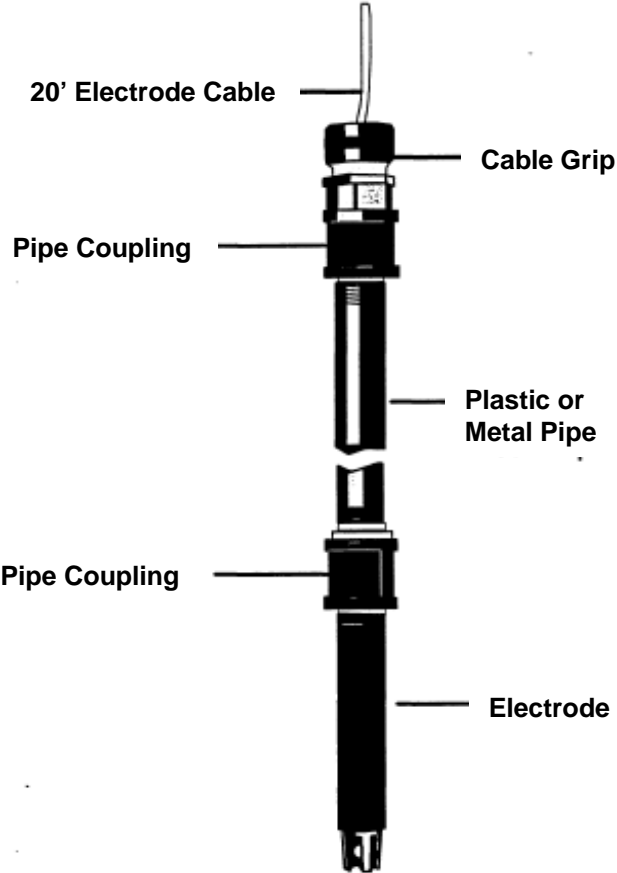


Figure 4-5 Direct Electrode to Instrument Connection





## 5. In-Line Mounting

### 5.1 General Information

#### Choice of pipe tee

The Model 7777 in-line mounting uses a Meredian II combination electrode body with  $\frac{3}{4}$  in NPT threads at both ends. This mounting allows the electrode body to be threaded directly into a Schedule 40,  $\frac{3}{4}$  in. NPT metal pipe tee in a pipe line. The electrode will **NOT** fit into standard **PLASTIC** pipe tees. Use a metal tee or the special Honeywell schedule 80 CPVC  $\frac{3}{4}$  in. pipe tee, Honeywell part number 31120167.

#### Avoiding damage to the electrode

The Meredian II electrodes for in-line mounting are supplied with an exposed membrane in the form of a glass bulb. Exercise care when inserting or removing the electrode from the pipe tee to prevent damage to the pH bulb.

#### Ensuring accurate temperature sensing

When process temperature varies considerably from ambient temperature, insulate the entire Meredian II electrode body to ensure accurate process temperature sensing.

#### Orientation of electrode

For reliable measurement, the electrode must be immersed in the process fluid. Therefore, orientation of the electrode vertical to the horizon is not recommended, as this orientation may prevent sufficient depth penetration to reliably immerse the sensor. The electrode mounting angle should be at least 45 degrees from vertical as shown in Figure 5-1. If solids are present in the process fluid, avoid angles exceeding 90 degrees from vertical to minimize accumulation of solids around the sensor.

#### Included in assembly

The Meredian II pH in-line electrodes Preamp installations (pH only) with integral cables terminate with quick disconnects on the electrode cable and therefore must be used with preamplifier module 31075705.

When Table 1 of the 7777 Model Selection Guide is 3, a preamplifier module is provided and serves as an interface between the pH electrode and the direct-reading pH instrument.

Preamplifier Module 31075705 (Table 1 = 3) is used with Honeywell microprocessor-based analyzers/controllers. Refer to the manual supplied with the direct reading pH instrument for an operational description of the measuring circuits.

#### Input to the preamplifier module

The input to the preamp module is the high impedance, low-level emf from the Meredian II pH electrode in the in-line assembly. Shielded low-loss cable connects the electrode to the preamp input. The module output is a low impedance, high-level signal which is easily carried long distances over unshielded cable.

#### Direct Instrument Installations (pH and ORP)

When Table I = 0, there is no preamp supplied. The electrode cable is terminated at the instrument. pH electrodes have either integral (Table II = 18) or quick-disconnect (Table II = 09) 20' cables. ORP electrodes have either integral 20' cables (Table II = 27, 28) or 50' cables (Table II = 29). ORP electrodes can also be ordered with 20' quick-disconnect cables (Table II = 11, 12).

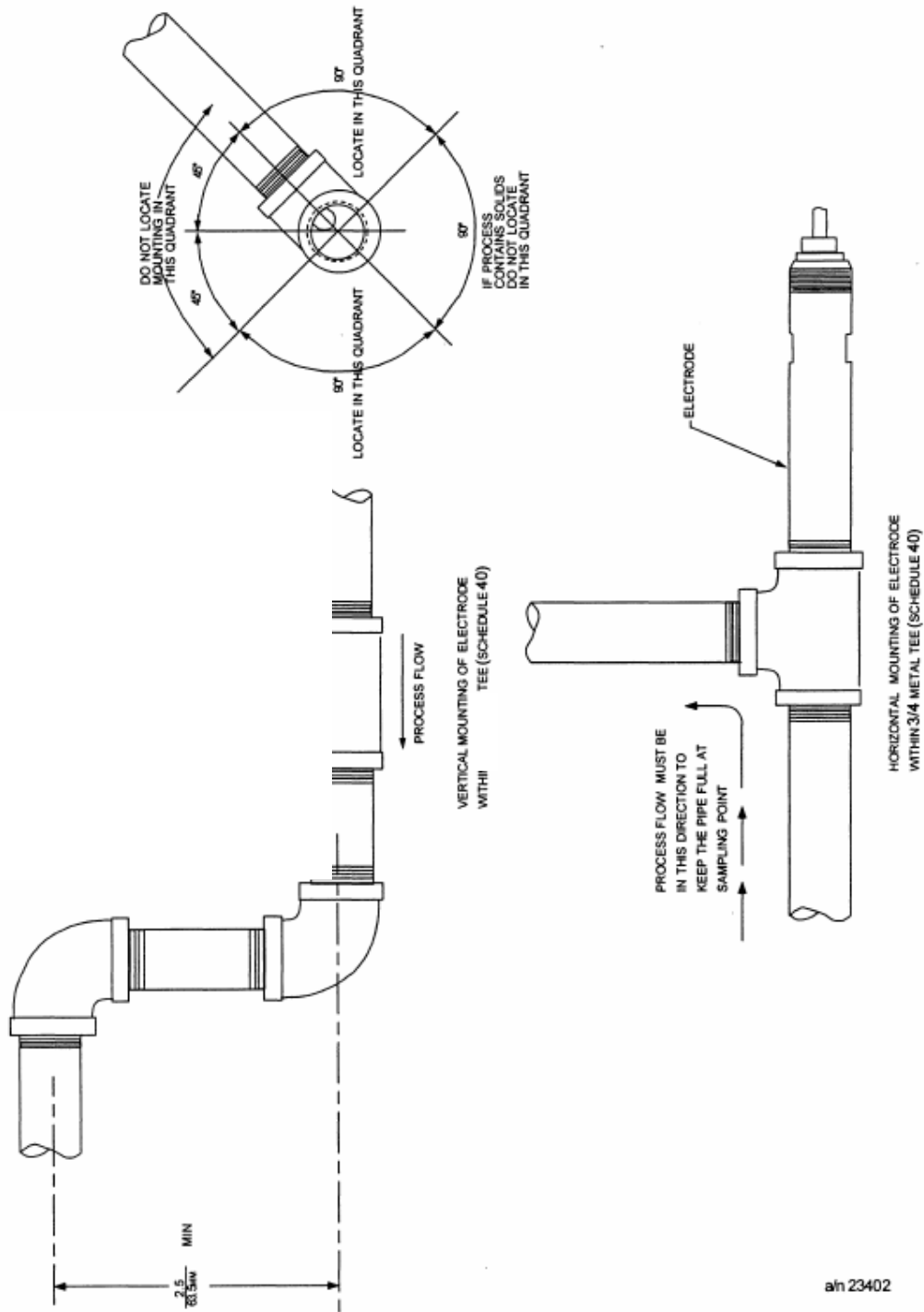


Figure 5-1 Proper Mounting Angle for Electrode

## 5.2 Preamplifier Module Remotely Mounted

### Application

Figure 5-2 illustrates this configuration.

### Materials required

The material supplied with this unit is listed below.

Quantity	Item
1	Preamplifier Module
1	Part number 31075723 Preamp Module Output Cable
1	mounting bracket for preamp module
1	Meredian II pH Combination Electrode with smooth tip.

Materials supplied by the user are listed below.

Quantity	Item
1	3/4 in. NPT Schedule 40 metal pipe tee or special Honeywell plastic pipe tee 31120167 (Electrode will not fit correctly into standard plastic pipe tee.)
1	3/4 in. NPT cable grip for 1/4 in. diameter cable

### Assembly

See Table 3-1 for order of assembly tasks. Orient the electrode as shown in Figure 5-1. Assemble the materials as shown in Figure 5-2.

### Orientation of electrode

The Meredian II electrode must be positioned so that the process solution is in constant contact with both the glass membrane (bulb-shaped measuring electrode) and the reference electrode. Refer to the electrode manual for additional guidance in handling and positioning the electrode.

### Dimensions

For mounting dimensions, see Appendix A

### Final electrical connections

Make final electrical connections (see Section 3.8).

### Arrangement of components

Figure 5-2 illustrates the configuration of components used for mounting electrode in-line with the preamplifier module remotely mounted.

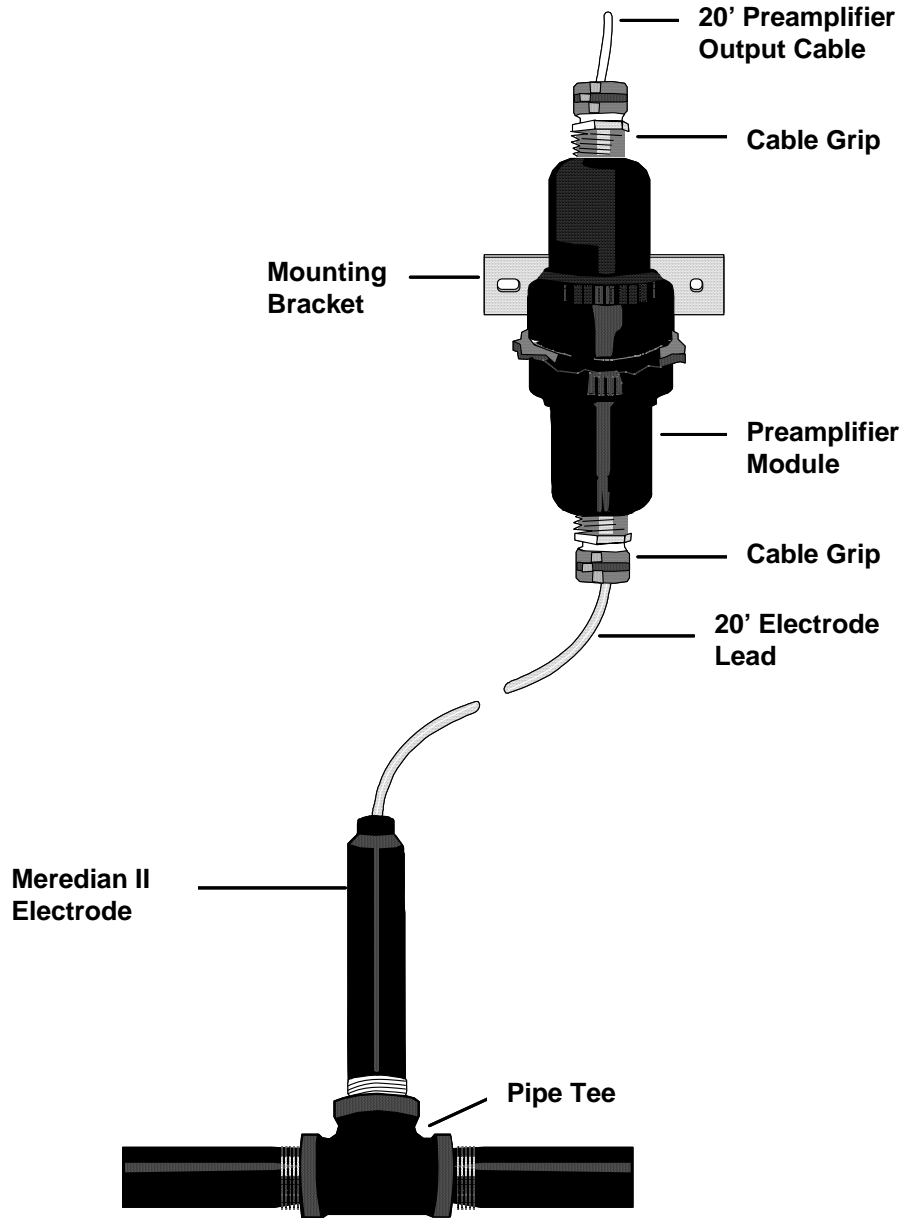


Figure 5-2 In-Line Mounting of Electrode with Remotely Mounted Preamplifier Module

## 5.3 Direct Electrode to Instrument Mounted

### Application

Figure 5-3 illustrates this configuration.

### Materials required

The material supplied with this unit is listed below.

Quantity	Item
1	Meridian II pH Combination Electrode with smooth tip.

Materials supplied by the user are listed below.

Quantity	Item
1	3/4 in. NPT Schedule 40 metal pipe tee or special Honeywell plastic pipe tee 31120167 (Electrode will not fit correctly into standard plastic pipe tee.)
1	3/4 in. NPT cable grip for 1/4 in. diameter cable

### Assembly

See Table 3-1 for order of assembly tasks. Orient the electrode as shown in Figure 5-1. Assemble the materials as shown in Figure 5-3.

### Orientation of electrode

The Meridian II electrode must be positioned so that the process solution is in constant contact with both the glass membrane (bulb-shaped measuring electrode) and the reference electrode. Refer to the electrode manual for additional guidance in handling and positioning the electrode.

### Dimensions

For mounting dimensions, see Appendix A

### Final electrical connections

Make final electrical connections (see Section 3.8).

### Arrangement of components

Figure 5-3 illustrates the configuration of components used for mounting electrode in-line with direct connection to instrument.

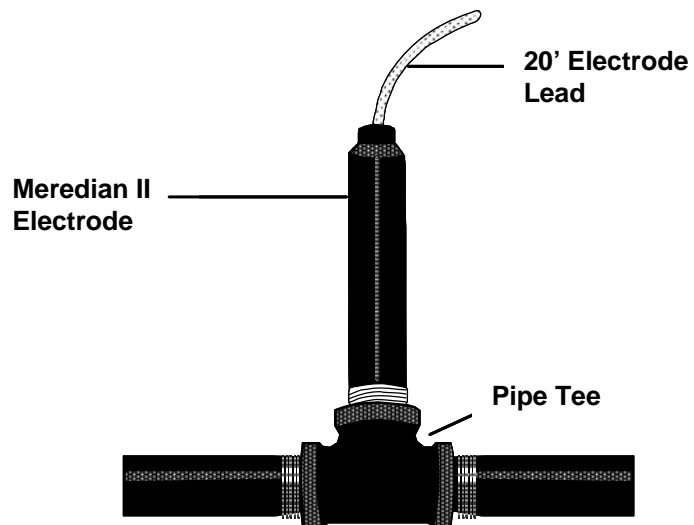


Figure 5-3 In-Line Mounting of Electrode with Direct Connection to Instrument

## 6. Electrical Connections

### 6.1 Electrical Connections for Electrodes with Integral Cable

#### 6.1.1 Direct to UDA2182 for Glass Meredian (pH)

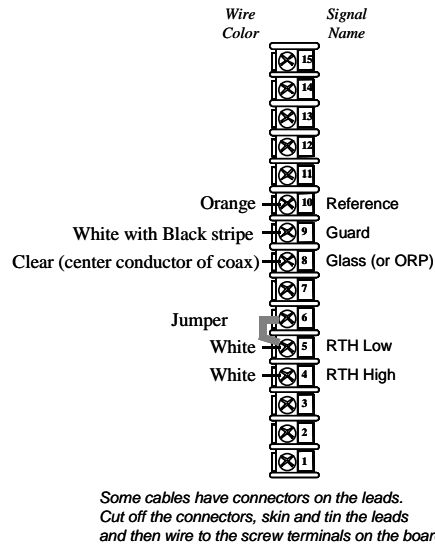


Figure 6-1 Direct to UDA2182 for Glass Meredian (pH)

#### 6.1.2 Direct to UDA2182 for ORP

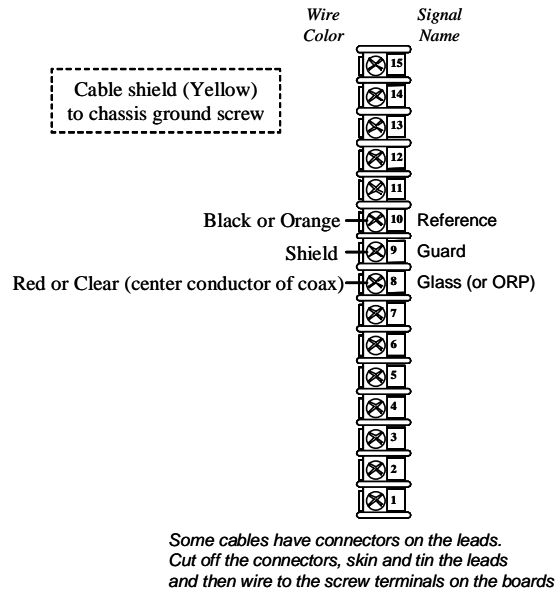


Figure 6-2 Direct to UDA2182 for ORP

### 6.1.3 pH Input from External Pre-amplifier/Cap Adapter to UDA2182

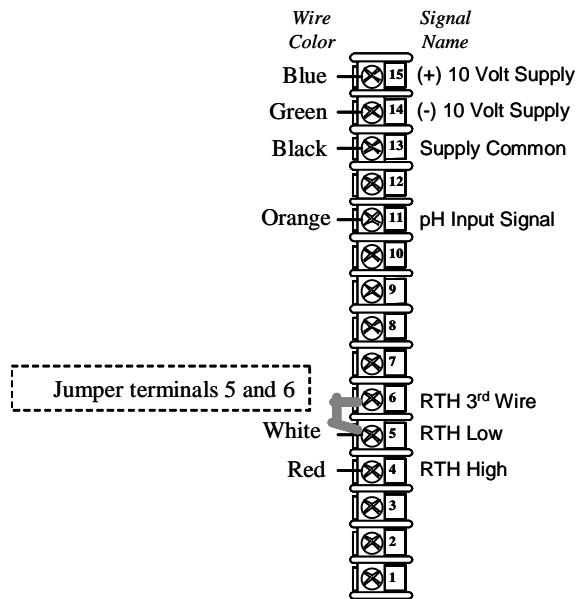


Figure 6-3 pH Input from External Pre-amplifier/Cap Adapter to UDA2182

### 6.1.4 Direct to APT2000 for Glass Meredian (pH)

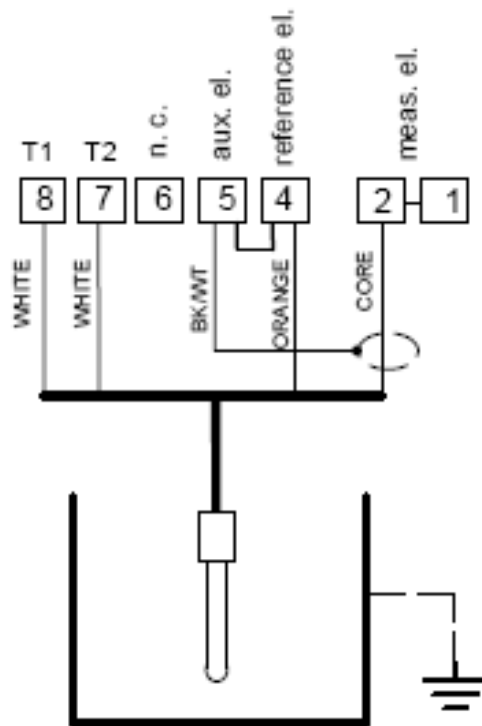


Figure 6-4 Direct to APT2000 for Glass Meredian (pH)



### 6.1.5 Direct to APT4000 for Glass Meredian (pH)

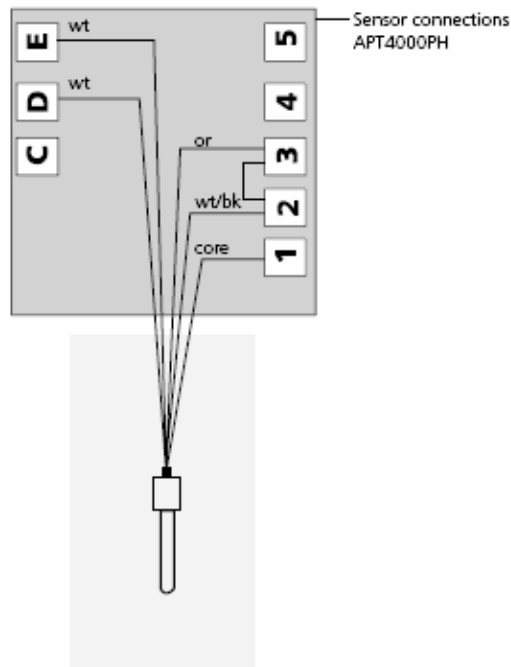
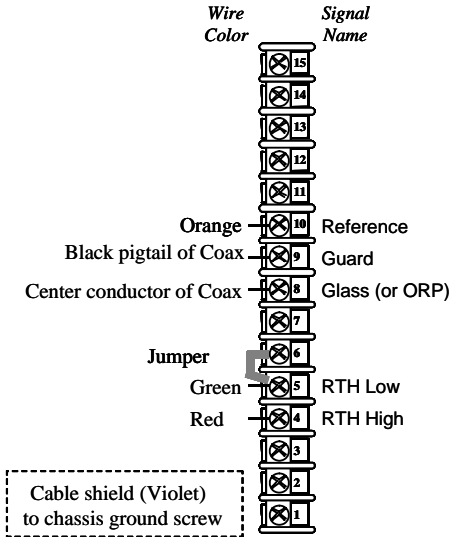


Figure 6-5 Direct to APT4000 for Glass Meredian (pH)

## 6.2 Electrical Connections for Electrodes with Quick Disconnect Cable Option

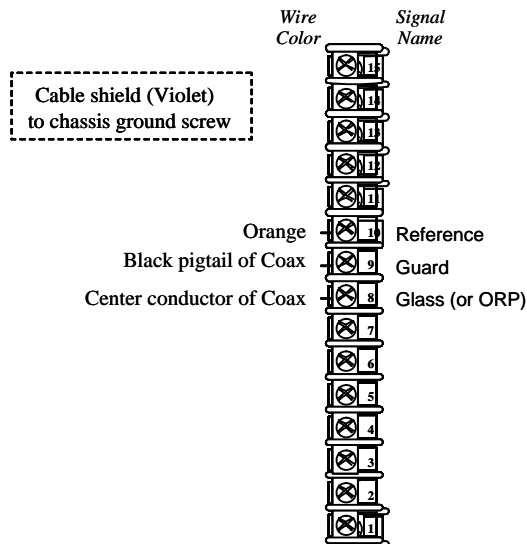
### 6.2.1 Direct to UDA2182 for Glass Meredian (pH) with Quick Disconnect



*Some cables have connectors on the leads.  
Cut off the connectors, skin and tin the leads  
and then wire to the screw terminals on the boards*

Figure 6-6 Direct to UDA2182 for Glass Meredian (pH) with Quick Disconnect

### 6.2.2 Direct to UDA2182 for Glass Meredian (ORP) with Quick Disconnect



*Some cables have connectors on the leads.  
Cut off the connectors, skin and tin the leads  
and then wire to the screw terminals on the boards*

Figure 6-7 Direct to UDA2182 for Glass Meredian (ORP) with Quick Disconnect

### 6.2.3 Direct to APT2000 for Glass Meredian (pH) with Quick Disconnect

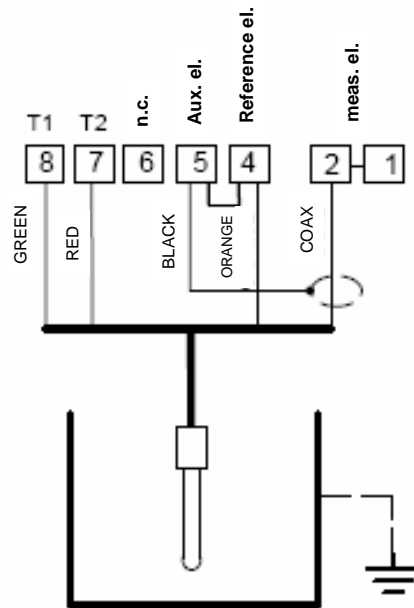
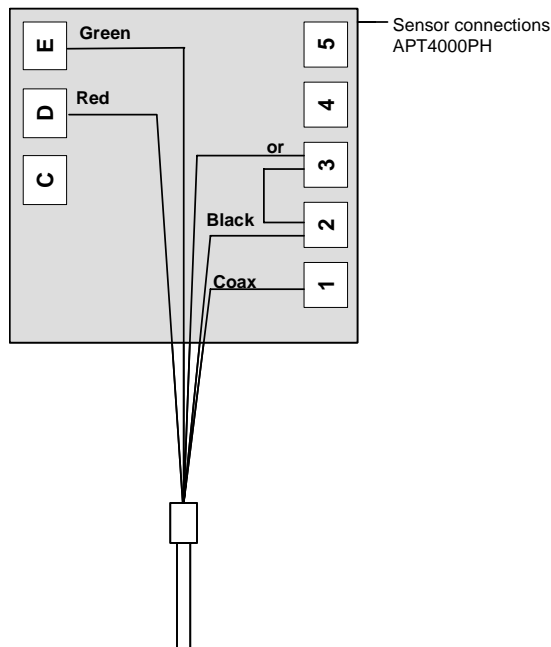


Figure 6-8 Direct to APT2000 for Glass Meredian (pH) with Quick Disconnect

### 6.2.4 Direct to APT4000 for Glass Meredian (pH) with ORP



\* Ignore brown, blue, and violet

Figure 6-9 Direct to APT4000 for Glass Meredian (pH) with ORP

## 7. Maintenance, Standardization, and Replacement Parts

### 7.1 Maintenance

#### Keeping electrode moist

When an electrode is removed from the process for any reason, assure that it does not become dry and remain dry for more than a short period of time. The electrode may require more frequent maintenance if used in a batch treatment installation which leaves the electrode dry between batches, or if it is exposed to process fluids that leave a deposit on the surface of the glass bulb and reference electrode.

The manual supplied with the electrode contains instructions for periodic checking, trouble-shooting, and for cleaning the electrode. Thoroughly rinse the electrode with water after any type of cleaning.

In addition to periodic cleaning, other electrode maintenance includes electrode performance checks, rejuvenation of the pH glass membrane and treatment for a clogged junction or severely dry electrode.

---

#### **CAUTION**

Read the manual supplied with the electrode before attempting any maintenance procedures. Improper handling of the electrode can result in damage that will affect accuracy.

---

### 7.2 Standardization

In addition to electrode maintenance, successful pH measurement relies on periodic standardizing of the measurement instrument and its electrode system. (This is required because all electrodes do not produce exactly the same potential in a solution of known pH. A periodic corrective adjustment eliminates any deviation from the standard value.) Establish regular intervals for standardizing according to conditions and experience.

Procedures for standardizing are given in the measuring instrument instructions.

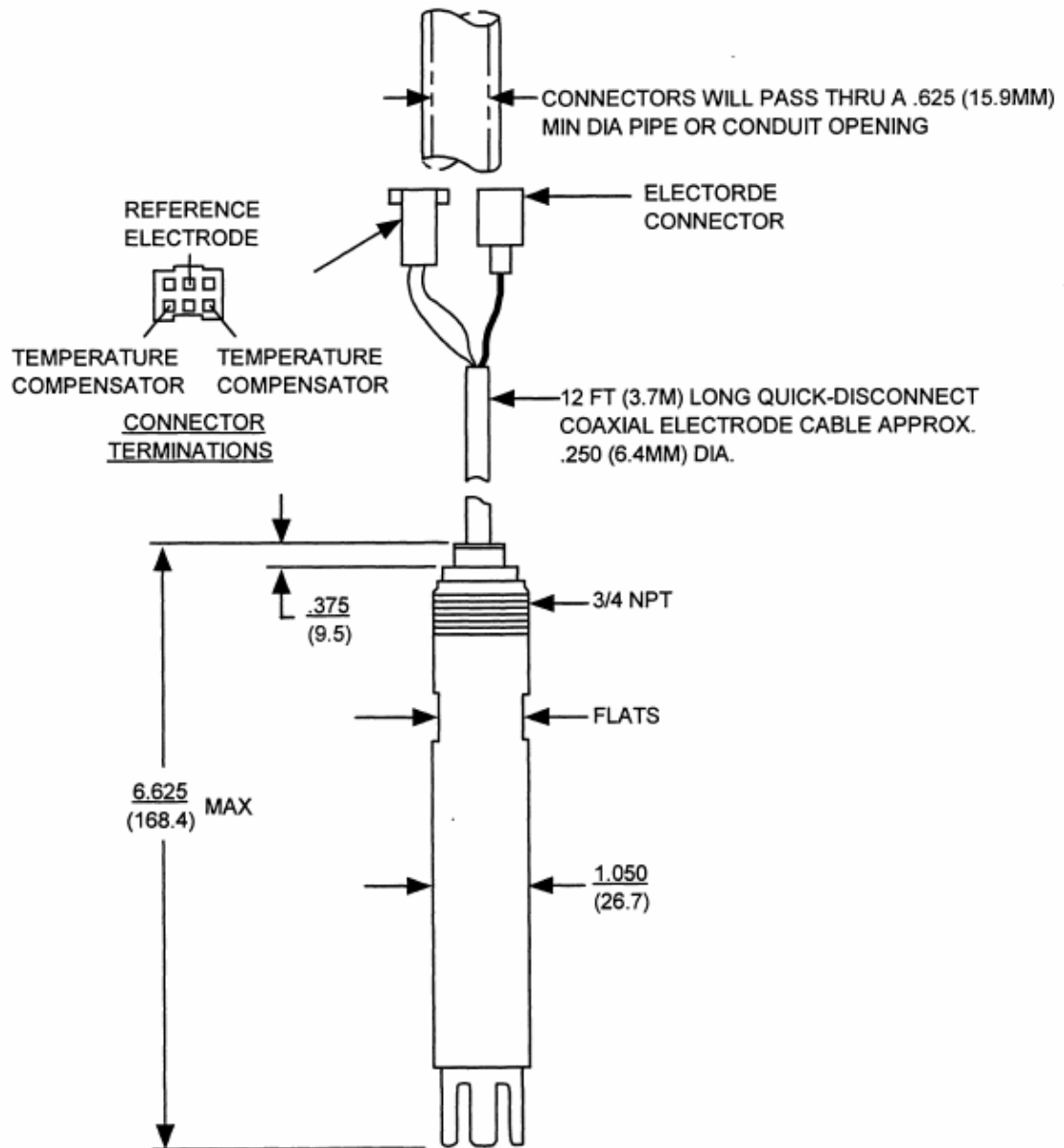
Buffer solutions for standardizing are listed in the electrode manual.

## 7.3 Replacement and Accessory Parts

Description	Part Number
Meridian II electrode	<i>See Table II description in section 2.4 of this manual</i>
Silicone grease (0.3 oz tube)	31090011 ( <i>supplied with every preamp module</i> )
Teflon tape, 1/2 in. x 260 in. roll	31811069 ( <i>provided with every Model 7777</i> )
CPVC pipe tee, special dimension 3/4 in. NPT for in-line mounting	31120167
Junction box, six-terminal	31316260
Cable grip, 3/4 in. NPT aluminum for 1/4 in. diameter cable (preamp to instrument cable)	31074354
Output extension cable, pH Contains six conductors (Alpha A1176 or Belden 9430, brown wire not used)	31834088 ( <i>specify length</i> )
Output extension cable, ORP (#22 coax)	31835002 ( <i>specify length</i> )
Electrode tip, smooth for in-line mounting	31074331
Electrode tip, guarded for immersion mounting	31074330
Parts for Preamplifier module	See manual supplied with preamplifier.
pH Buffers	
4.01 pH	31103001
6.86 pH	31103002
9.18 pH	31103003

## 8. Appendix A – Dimension Drawings

### 8.1 Remote Mounting with Preamp

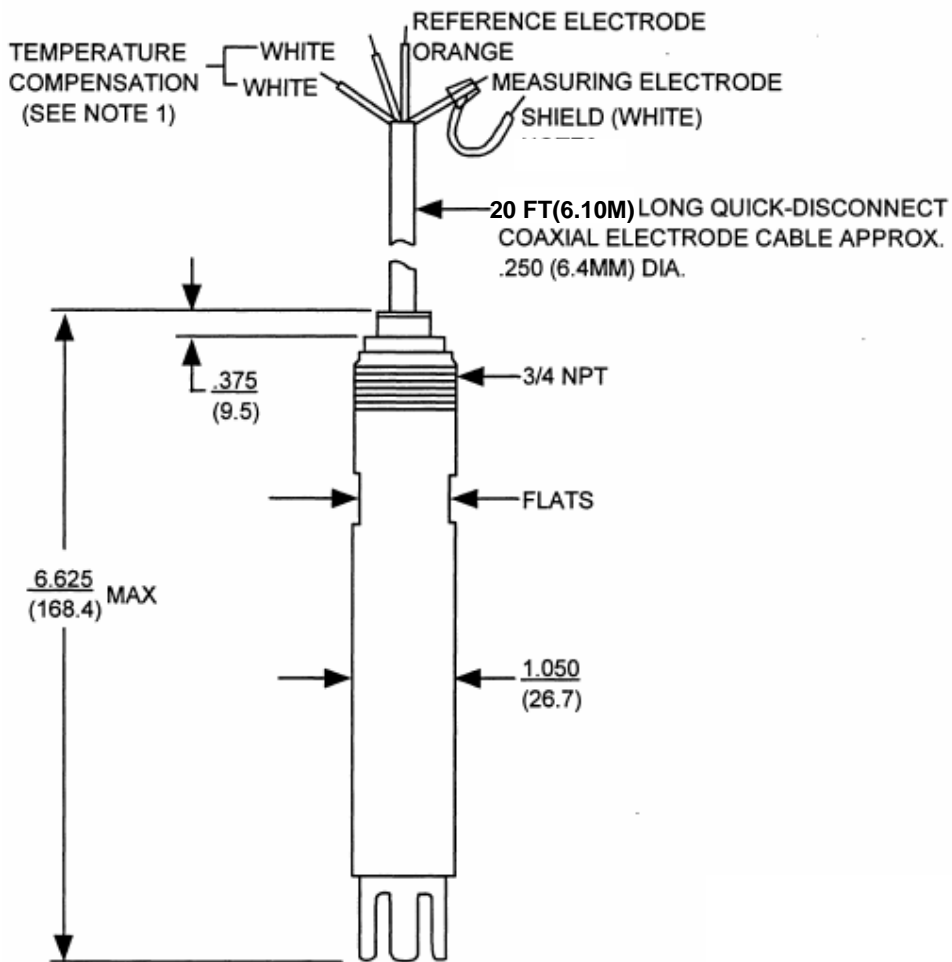


NOTES

1. FOR MOUNTING OF PREAMPLIFIER MODULE (HONEYWELL P/N 31075704 & 31075705)

Figure 8-1 Remote Mounting with Preamp

## 8.2 Remote Mounting – Direct instrument connection (pH/ORP) or connection to Junction Box (ORP only)



**NOTE 1: TEMPERATURE COMPENSATION LEADS ARE NOT USED ON REDOX ELECTRODES**

**Figure 8-2 Remote Mounting – Direct instrument connection (pH/ORP) or connection to Junction Box (ORP only)**

### 8.3 In-line Mounting with Preamp

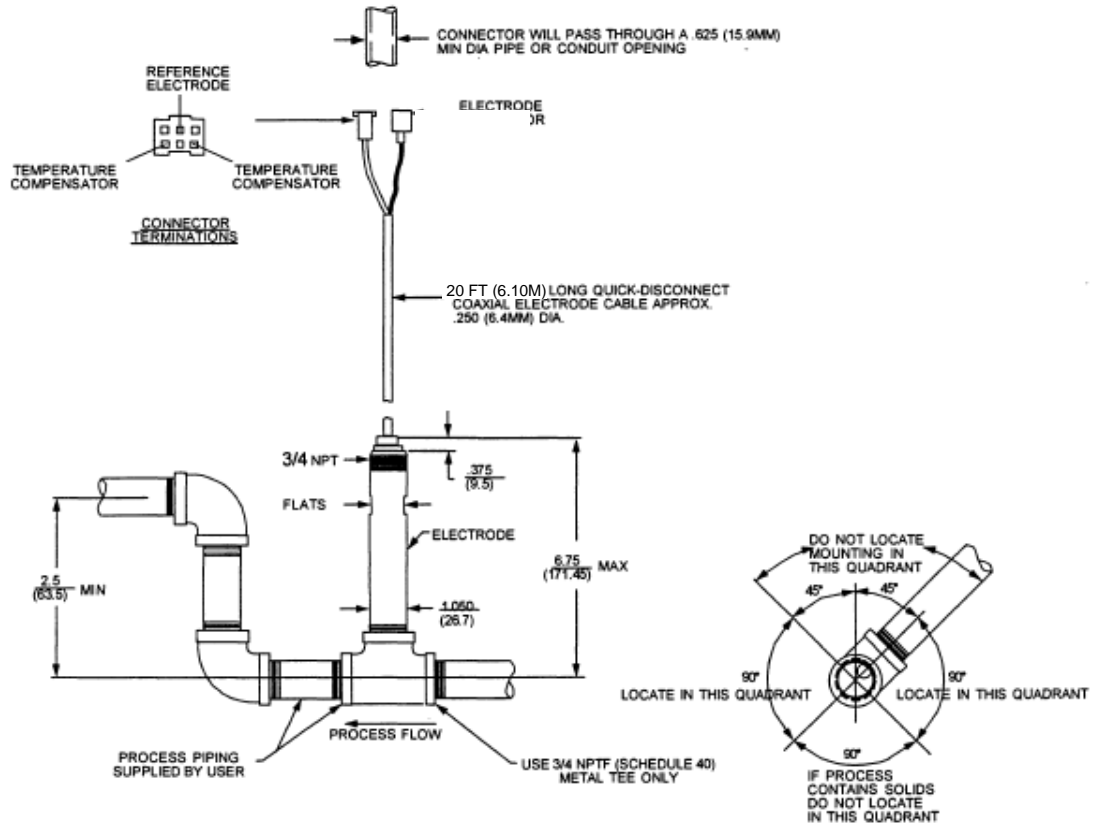


Figure 8-3 In-line Mounting with Preamp





**Honeywell**

---

**Honeywell Process Solutions**  
512 Virginia Drive  
Fort Washington, PA 19034