Honeywell

4974 Series Sanitary Mounting Clean-In-Place Conductivity Cells Installation and Maintenance

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Rev 1
June 2009

Honeywell Process Solutions

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Revision 1 – June 2009

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About This Document

Abstract

The purpose of this document is to support the installation, operation and maintenance of the 4974 Series Sanitary Mounting Clean-in-Place Conductivity Cells.

Revision Notes

The following list provides notes concerning all revisions of this document.

Rev. ID	Date	Notes
0	10/96	This document is the initial release of the Honeywell version of the 4974 Series Sanitary Mounting Clean-In-Place Conductivity Cells Installation and Maintenance manual. This publication was originally released under the L&N system as 277078 Rev. A1.
1	June 09	Consolidation

References

Honeywell Documents

The following list identifies all Honeywell documents that may be sources of reference for the material discussed in this publication.

Document Title	ID #	Binder Title	Binder ID #

Contacts

The following list identifies important contacts within Honeywell.

Organization	Telephone	Address
Honeywell TAC	1-800-423-9883 Voice	512 Virginia Drive Fort Washington, PA 19034

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Figures

1. Introduction

1.1 Overview

The 4974 series Conductivity Cells, Figure 1, have a rugged configuration for reliable continuous measurements of electrolytic conductivity in industrial water processes at the maximum temperature and pressure shown in Specifications.

For excellent corrosion resistance, cell bodies are made polyethersulfone (PES). Cells with constants 0.01 and 0.1 are made with titanium electrodes. Cells with constants 1.0 and 10 are made with high density carbon electrodes.

The 4974 series cells are equipped with an integral standard 20 foot lead, and may be equipped with a junction box type universal head for longer lead lengths.

ATTENTION

Conductivity Cells are manufactured with an embedded EEProm that contains the cell constant and cell factor information. When the EEProm leads (Brown and Blue) , junction box head terminals (E) and (F) are connected to a UDA2182 Analyzer these parameters are automatically uploaded into the analyzer.

1.2 Description

All 4974 Series Conductivity Cells are suitable for use in Clean-In-Place (CIP) fittings. They are one piece molded units that cannot come apart and require no replacement parts.

The physical appearance of the cells is shown in Figure 1. All cells are similar in construction with differences as noted below:

Cell constant 0.01

This cell has an outer electrode length of 2 3/4 inches. The temperature compensation sensor is located inside the inner electrode (Figure 1).

Cell constant 0.1

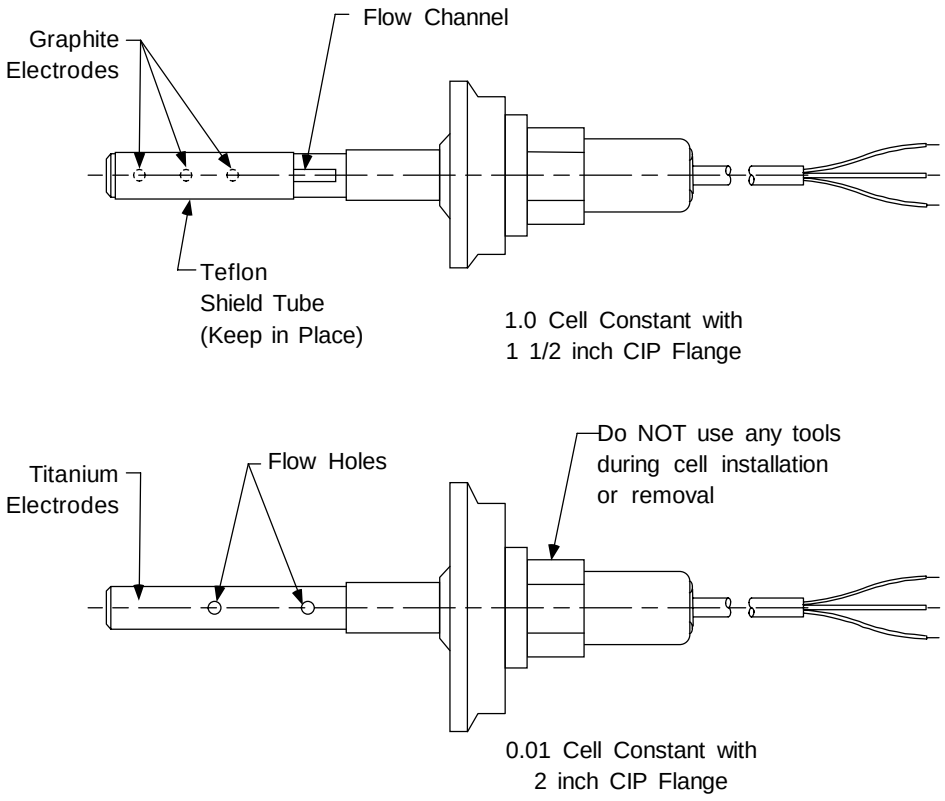
This cell has an outer electrode length of 2 inches. The temperature compensation sensor is located inside the inner electrode.

Cell constant 1.0

This cell differs visually from the 10 constant cell by having a wider shielded flow channel that conducts the solution being measured past the electrodes of the cell. The spacing of the electrodes also differs; the three electrodes are 1/4 inch diameter graphite spaced 1/16 in. apart. The temperature compensating sensor is integral with the cell body (Figure 1).

Cell constant 10

This cell differs visually from the 1.0 constant cell by having a narrower shielded flow channel that conducts the solution being measured past the electrodes of the cell. The spacing of the electrodes also differs; the three electrodes are 1/8 inch diameter graphite spaced 5/8 in. apart. The temperature compensating sensor is integral with the cell body.



NOTE: Cell Constants of 0.1 and 10.0 are similar in construction.

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Figure 1-1 4974 Series conductivity Cells

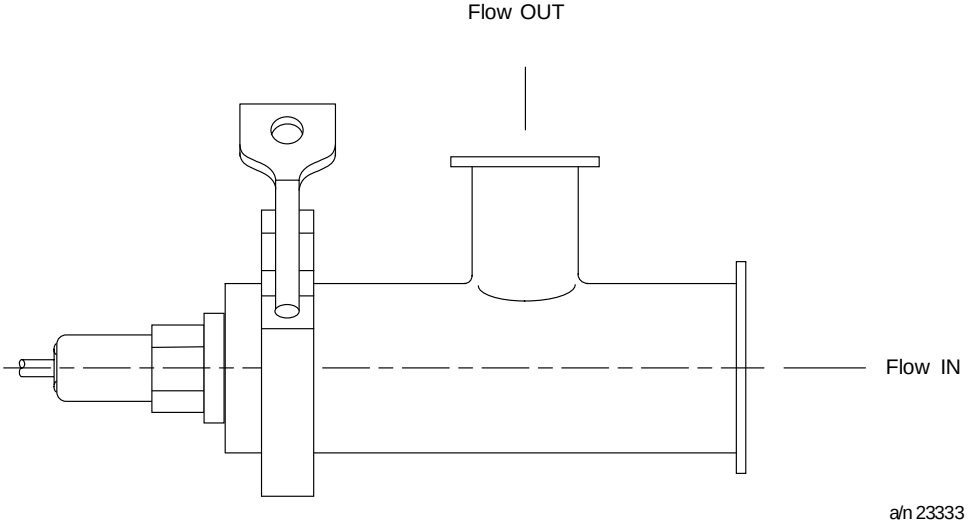

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Figure 1-2 Pipe Tee Cell Mounting

2. Specifications

Automatic Temperature Compensation:	Supplied on all cells
Cell Constants (cm-1):	0.01, 0.1, 1.0 and 10
Wetted Parts (Materials of construction meet the requirements of FDA 21 CFR, Part 177)	
Cell Body:	PES (polyethersulfone), RTV (Silicone Elastomer), 316 L Stainless Steel
Electrodes	
0.01 and 0.1 constant	Titanium
1.0 and 10 constant	High density graphite with Teflon guard tube
Temperature, Maximum:	130°C (266 F) at maximum pressure 105°C (221 F) for PVC cable
Pressure, Maximum:	1034 kPa (150 psig) at maximum temperature
Electrical Connections:	6 conductor shielded 22 gage PVC insulated cable
Standard	20 foot lead
Optional head-type (universal head) junction box with terminals for extension wire and 1/2 inch NPT conduit connection	
Mounting:	1 1/2 inch and 2 inch tube sanitary fittings
Insertion Depth:	(from process side of sanitary fitting to end of cell)
0.01 constant	3 1/4 in. (83 mm)
0.1 constant	2 1/4 in. (57 mm)
1.0 and 10 constant	3 1/2 in. (89 mm)

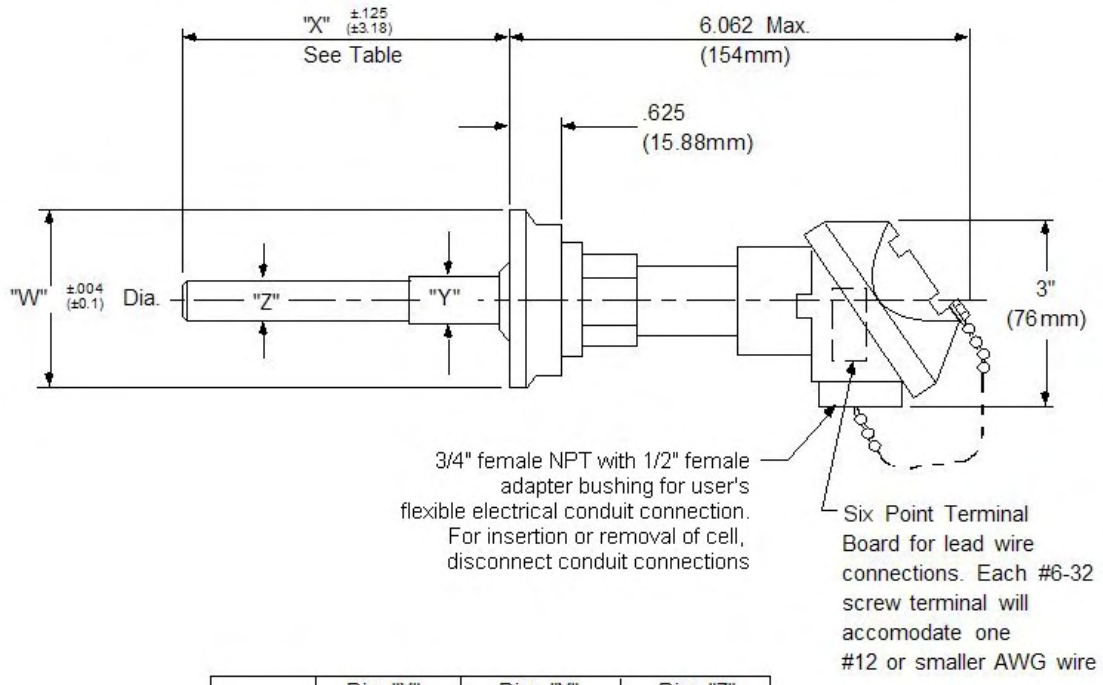


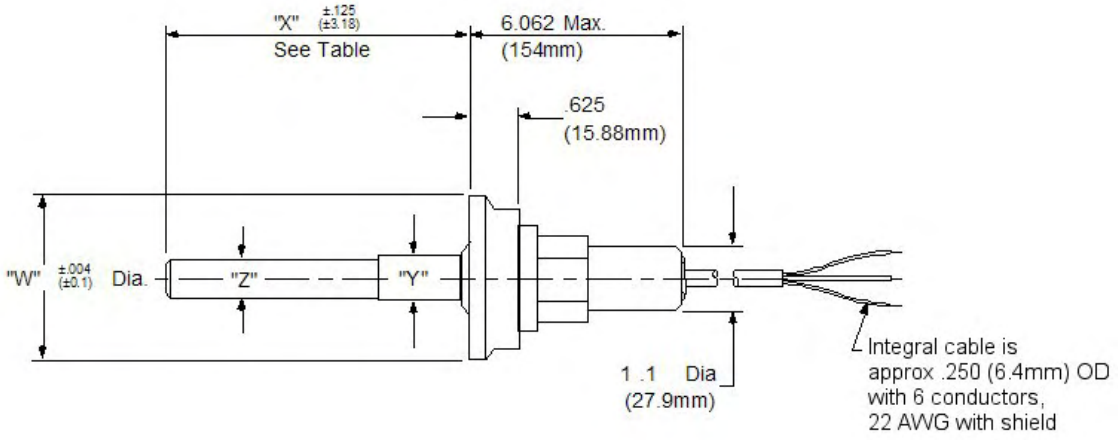
Table I	Dim "X"		Dim "Y"		Dim "Z"	
	Inch	mm	Inch	mm	Inch	mm
001	3.250	82.6	.703	17.9	.542	13.8
X01	2.500	63.5	.703	17.9	.542	13.8
XX1	3.437	87.3	.593	1 5	.524	13.3
X10	3.437	87.3	.593	1 5	.524	13.3

Table IV	Dim "W"	
	Inch	mm
015	1.980	50.3
020	2.520	64

NOTE:

1. To maintain Cell/CIP fitting pressure and temperature service ratings, use appropriate heavy construction clamp/gasket combination. (Clamp with wing nut tightened to 25 in-lb torque and Epom, Viton or Silicone gasket.)

Figure 2-1 Dimension Drawing, Catalog 4974-☐-☐-XI-☐-☐



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NO TE:

1. To maintain Cell/CIP fitting pressure and temperature service ratings, use appropriate heavy construction clamp/gasket combination. (Clamp with wing nut tightened to 25 in-lb torque and Epom, Viton or Silicone gasket.)

Figure 2-2 Dimension Drawing, Catalog 4974-□-□-20-□-□

3. Installation

3.1 General Requirements

Observe the following general requirements before installing a conductivity cell. Specific requirements for particular installations are given in later sections.

- Do not remove the Teflon guard tube from 1.0 or 10 constant cells, as this will change the cell constant.
- Do not use any cell in solutions which can affect the fittings or cell materials. If in doubt, contact Honeywell.
- Avoid all chlorinated hydrocarbons. Titanium, Teflon, PES, carbon, and silicone rubber are the only cell materials in contact with measured solutions. These materials are inert to corrosive chemicals such as mineral acids, oxidizing agents, and caustic solutions.
- Avoid trapped air; see that air is not trapped in the cell flow channels.
- Do not use the cell in solutions having temperatures or pressures greater than the maximum limits in the Specifications.
- Use appropriate clamp and gasket materials to maintain temperature and pressure specifications.
- Avoid locations where the operator must take an awkward position to install or remove the cell.

3.2 Sanitary Pipe Line Mounting

- In addition to the general requirements above, note the following with regard to CIP mounting:
- Make certain the liquid head is above the cell location during measurement. Vertical insertion (from above) or horizontal insertion can be used.
- Allow at least one-half inch clearance beyond the end of the cell.
- Have the solution flow up into the end of the cell since it is less likely to result in clogging by solids settling in the cell channels.
- Ensure that the solution moves continuously through the cell channels to be sure that a representative sample is being measured at all times.

3.3 Sanitary Pipe Tee Mounting

In addition to the general requirements above, note the following with regard to pipe tee mounting:

- When mounting the cell in a pipe tee (Figure 1-2), have the solution (1) enter the tee from below and exit from the side or (2) enter the tee from the side and exit from the top. To ensure flooding of the cell under all conditions, be sure the electrode is as far below the horizontal pipe run as possible so that it is always covered. If the cell is not flooded, the conductivity reading may go to zero.
- Mount the cell so that the sample will flow through the cell channel toward the mounting end of the cell, exiting through the other channel hole or through the outer electrode holes.
- Locate the cell on the pressure side, not the suction side, of pumps.

- Avoid a horizontal cell mounting having the flow channel (Figure 1) opposite the flow exit of the pipe line, especially for 1.0 and 10 constant cells. See also section 3.4 “Air Trapped in Cell Flow Channel”.

3.4 Electrical Connections to UDA Analyzer

Terminal board connections for measuring instruments are given in directions supplied with the instruments. Figures 3 and 4 show the lead arrangements of the conductivity cells.

To avoid the possibility of AC pickup in the cell leads, separate them from all AC line voltage wiring or run them in a separate grounded conduit.

ATTENTION

Do NOT use shielded cable except where shown in the following Figures.

WARNING

For 6 conductor cells, EEPROM memory device is ESD sensitive- blue and brown leads; junction box head terminals (E) and (F)

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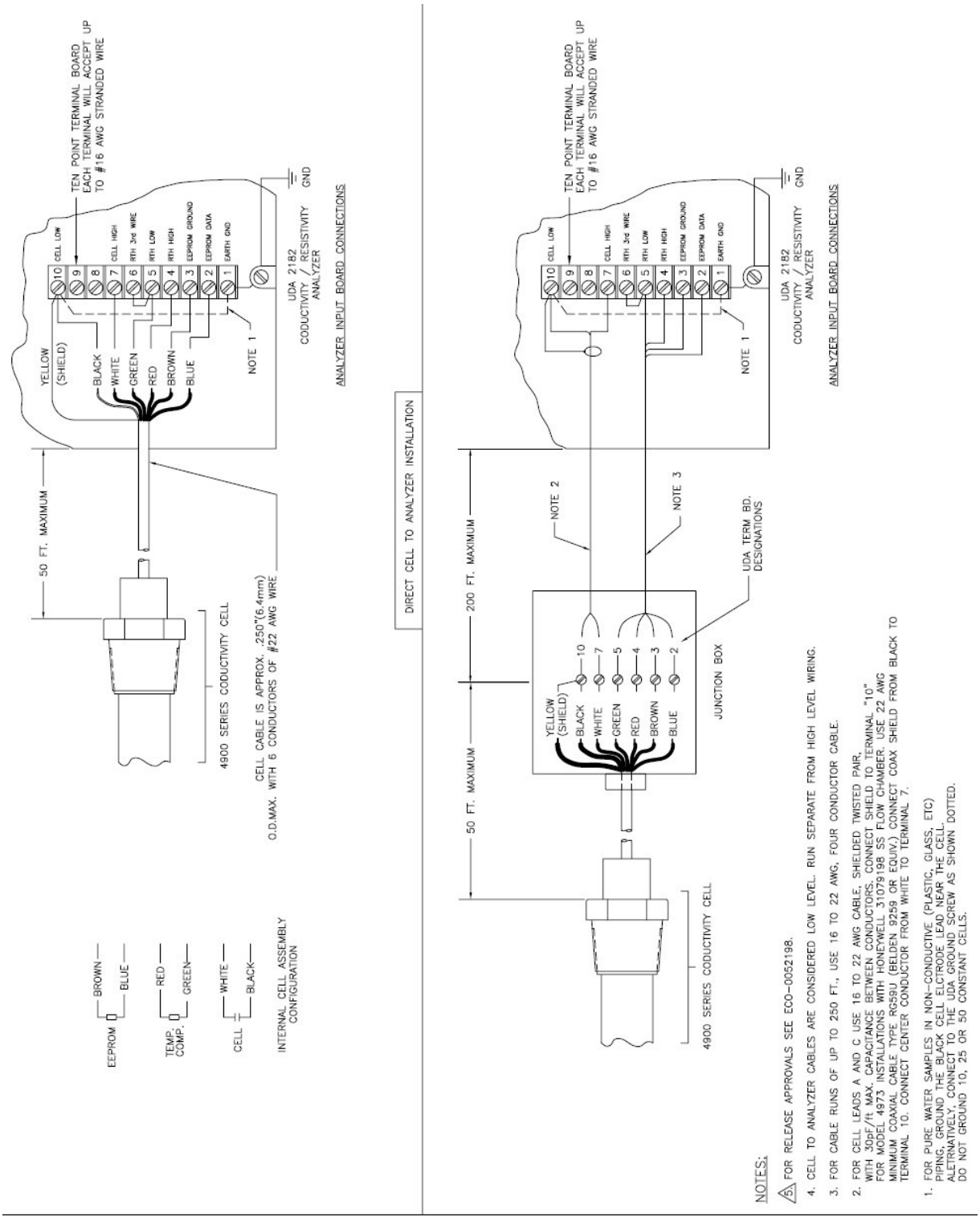
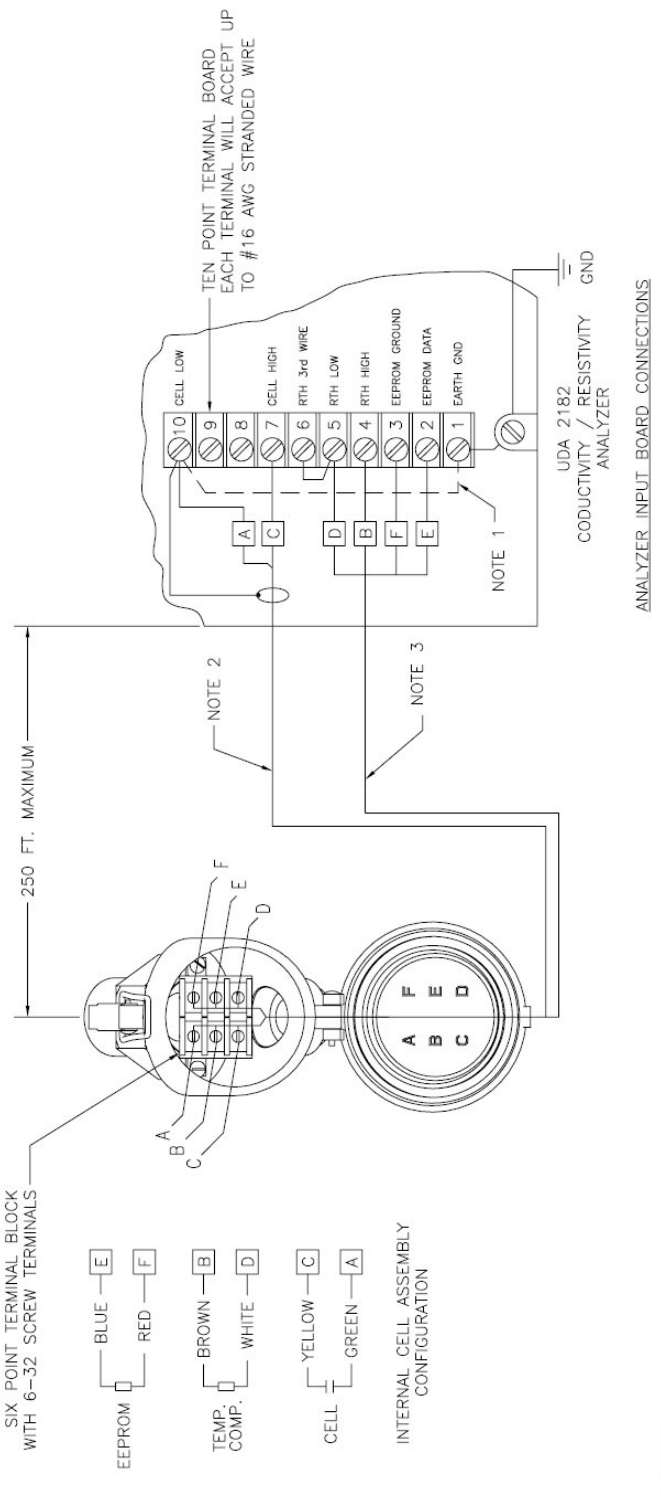


Figure 3-1 Cells Without Junction Box Head



NOTES:

5. FOR RELEASE APPROVALS SEE ECO-005219B.
4. CELL TO ANALYZER CABLES ARE CONSIDERED LOW LEVEL. RUN SEPARATE FROM HIGH LEVEL WIRING.
3. FOR COMPENSATOR AND EEPROM LEADS USE 16 TO 22 AWG. FOUR CONDUCTOR CABLE.
2. FOR CELL LEADS A AND C USE 16 TO 22 AWG CABLE, SHIELDED TWISTED PAIR, WITH 30pF/ft MAX. CAPACITANCE BETWEEN CONDUCTORS. CONNECT SHIELD TO TERMINAL "10" FOR MODEL 4973 INSTALLATIONS WITH HONEYWELL 31079198 SS FLOW CHAMBER. USE 22 AWG MINIMUM COAXIAL CABLE TYPE RG59U (BELDEN 9259 OR EQUIV.) CONNECT COAX SHIELD TO TERMINALS "A" AND "10" CONNECT COAX CONDUCTOR TO TERMINALS "C" AND "7".
1. FOR PURE WATER SAMPLES IN NON-CONDUCTIVE (PLASTIC, GLASS, ETC) PIPING, GROUND THE BLACK CELL ELCTRODE LEAD NEAR THE CELL. ALETRNATIVELY, CONNECT TO THE UDA GROUND SCREW AS SHOWN DOTTED. DO NOT GROUND 10, 25 OR 50 CONSTANT CELLS.

Figure 3-2 Cells With Junction Box Head

4. Maintenance

4.1 Overview

The only Conductivity Cell maintenance that may be required is occasional cleaning. When cleaning, use standard CIP cleaning procedures. Do not use a brush or pipe cleaner and avoid scratching electrode surfaces or the sanitary fitting. Never use a wrench or other tool to remove a cell from its sanitary fitting, as this may destroy the seal.

If the gasket binds the fitting to the piping system after removal of the clamp, do not pry on the cell or fitting with tools. Try running hot water over the gasket area for about one minute, then grasp the cell housing and gently "jiggle" the fitting free.

4.2 Cell Constant Recertification

Cells returned to Honeywell for recertification of the cell calibration factor must have the sanitary fitting protected against nicks or scratches during shipment.

4.3 Check Conductivity System

To check the conductivity system comprising the conductivity cell, leadwires, and measuring instrument, make a measurement in a reference solution of known conductivity. Alternatively, use a second cell having the same constant and temperature compensation and compare the two readings. Be sure the cells are not touching the bottom or sides of the container for this test.

If Table II of the conductivity cell model number is 333, the normal resistance of the temperature sensor as measured across the red (B) and green (D) leads is 8550 ohms at 25 C.

To check the electrode insulation, connect an ohmmeter across the black (A) and white (C) leads. With a dry and clean cell, the resistance should be greater than 50 megohms.

NOTE: Never connect a test instrument access the Blue (E) and Brown (F) leads. Damage to the cell memory device may occur.

4.4 Troubleshooting

A series of below normal conductivity readings could indicate that the cell is not filled with solution resulting in a lack of response.

If the plastic surface of the cell has a grayish dull appearance instead of its normal glassy appearance, the cell has been exposed to temperature above its specified maximum. Check the solution temperature and replace the conductivity cell.

4.5 Air Trapped in Cell Flow Channel

If measurement errors appear for horizontal mounting of a 1.0 or 10 constant cells, air may be trapped in the cell flow channel. Take one of the following actions to eliminate this problem:

1. Increase flow to at least 1 GPM past the cell.
2. Rotate the cell mounting so that its flow channel faces the same direction as the pipeline flow exit.
3. Install the cell vertically.

4.6 Accessories and Parts

Description	Part Number
Teflon Shield	
White for 1.0 constant cell	31021599
Clear for 10 constant cell (heat shrink onto cell at 300 F max.)	31018760

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