



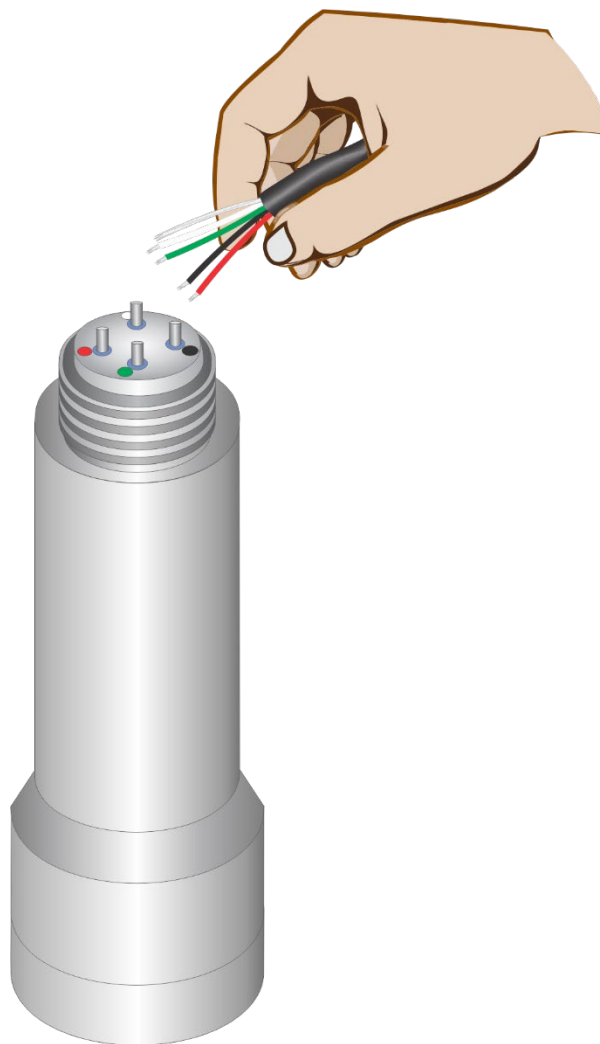
ENCARDIO RITE

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USERS' MANUAL

CABLE JOINTING

Cable to Sensor



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1 GENERAL DESCRIPTION

Cable is lifeline of any sensor. No matter how reliable, rugged and accurate a sensor is, the consequence of a broken cable or damaged joint is as bad as that of a damaged or a poor sensor.

In the instrumentation of any civil engineering projects, proper and good quality cabling is an essential part of any instrumentation program. Moreover, in most installations the sensor, cable joint and a large part of cable is permanently embedded and no future access is available for any maintenance or corrective action. It is almost impossible to salvage embedded instruments. Very careful and skilled cabling is consequently required.

It is important that cable jointing is not taken casually. A properly designed cable joint with the instructions meticulously followed is essential.

1.1 Glass to metal seal cable connection

The cable jointing procedure described in this manual is for cables with OD 4-8 mm used in sensors with glass to metal seal connection.

In the sensor, leads from the coil magnet are terminated on a glass to metal seal which is integrally electron beam welded to the stainless steel body of the sensor. The two pins marked **red and black** are connected to the coil magnet. The other two pins marked **green and white** are connected to a thermistor for measurement of temperature.

A cable joint housing and cable gland is provided for the cable connection. For 4 - 8 mm diameter cables, Encardio-rite provides a 26 mm OD x 55 mm long cable joint housing with a PG 9 cable gland. The threads on all Encardio-rite sensors for the cable joint housing is M22 x 1.5 x 15 L.

Cables with different diameter may require modified cable joint housings. In such cases, it is best to get in touch with Encardio-rite along with the cable specifications. In case a non-standard cable joint housing is required, it should be specifically mentioned in the purchase order.

Following sensors have glass to metal seal for cable connection at site.

Name of sensor	Cable connection	Cable used	Cable gland used
EPP-30V piezometer	Glass to metal seal	Cable with OD: 4-8 mm (PVC or PU)	PG-9/PG-13.5
EPP-40V small size piezometer			
EPP-60V low pressure piezometer			
EPU-20V uplift pressure sensor			
ELC-30S centre hole load cell			
ELC-31V centre hole load cell			
EPS-30V-S earth pressure cell			
EPS-30V-C concrete pressure cell			
EPS-30V-I soil-concrete interface pressure cell			
ESC-30V shotcrete stress cell			
EPS-30V-J jackout pressure cell			
ETT-10V temperature meter			

1.2 Conventions used in this manual

WARNING! Warning messages calls attention to a procedure or practice, that if not properly followed could possibly cause personal injury.

CAUTION: Caution messages calls attention to a procedure or practice, that if not properly followed may result in loss of data or damage to equipment.

NOTE: Note contains important information and is set off from regular text to draw the users' attention.

This users' manual is intended to provide you with sufficient information for making optimum use of vibrating wire strain meters in your applications. To make this manual more useful we invite your valuable comments and suggestions regarding any additions or enhancements.

2 TOOLS & ACCESSORIES REQUIRED

- 2.1 Temperature controlled soldering iron 25 watts
- 2.2 Solder wire Rosin 63/37 RF-3C, 30 swg or equivalent
- 2.3 Cable jointing compound
- 2.4 Spanner 18/19
- 2.5 Wire Stripper
- 2.6 Rod for stirring epoxy (stainless steel or glass, around 3 mm ϕ x 150 mm length)
- 2.7 Rotary tin cutter
- 2.8 Spatula
- 2.9 Funnel or syringe to pour epoxy into housing
- 2.10 Acetone (commercial)
- 2.11 Tooth brush
- 2.12 Cloth for cleaning (lint less)
- 2.13 Model EDI-51V portable vibrating wire indicator for checking sensor functioning

3 INSTALLATION PROCEDURE

3.1 Choosing a work area

The jointing compound requires 24 hours for proper setting. Choose a clean, dry and well ventilated work area under shade where the joints after potting can be left undisturbed for 24 hours. A polyethylene sheet may be spread over the work table to prevent any spillage of jointing compound from adhering to the table top.

3.2 Preparation of cable

3.2.1 Check the cable visually for any cuts, damaged sheath etc. Measure the appropriate length, as specified by the customer. Cut 1 m of extra length for jointing. Care should be taken in determining the correct length of cable required. Cable to cable jointing, should as far as possible be avoided.

3.2.2 Strip the sheathing of one end of the sensor cable so that ~ 25 mm (~1 inch) length of conductors are exposed.



3.2.3 Remove the exposed aluminium foil shields to uncover the conductor pairs. Untwist the conductor's pairs to separate the individual conductors and fan out the conductors.



3.2.4 Remove the conductor insulation to avoid damage to the conductors. If a wire stripper is not available to cut the insulation, it can be removed with a sharp knife or blade. Extreme caution should be exercised while removing the insulation to avoid notching or cutting through the copper strands

3.2.5 Strip ~ 5 mm (~0.2") of insulation from the end of each conductor. Slightly twist the copper strands clockwise so that they remain bunched together and cover them with solder using the soldering iron. Do not use any flux.

3.2.6 Repeat steps from 3.2.2 to 3.2.5 on the other end of the cable (to connect to readout unit for checking sensor functioning).

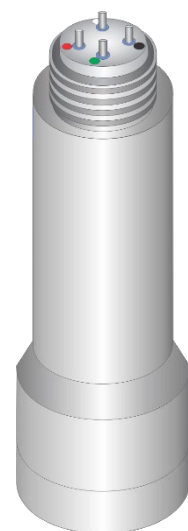
3.3 Preparation of sensor for connecting to cable

3.3.1 Remove the cable joint housing from the cable end of the sensor giving access to the four pin terminals that are marked with red, black, green and white colors.

3.3.2 Clean the terminals with the toothbrush. Do not use any acetone for cleaning as it may damage the glass to metal seal.

3.3.3 Though the terminals are tinned at the factory, do this again for achieving better solder-ability. Do not use any flux. Do not apply the hot soldering iron to the terminals for more than 3 seconds at a time as it may damage the glass to metal seal permanently

3.3.4 Clean the threads of the sensor and that of the cable joint housing with acetone. Also clean the portion of the outer sheath of the cable that will go inside the cable joint housing.



CAUTION: Let the acetone dry off fully. Presence of acetone degrades the epoxy bond.

3.4 Jointing of cable to the sensor

- 3.4.1 Hold the sensor with any fixture.
- 3.4.2 Slide the cable gland PG 9 and then the cable joint housing over the prepared end of the cable (refer to figure 3.1).
- 3.4.3 Solder the red & black (signal), green & white (thermistor) leads of the cable to the corresponding terminals on the sensor. Check visually for any shorting with the body. The solder joint should be neat.
- 3.4.4 By connecting model EDI-51V portable vibrating wire readout unit to the other side of the cable, check that the sensor is giving the correct reading.

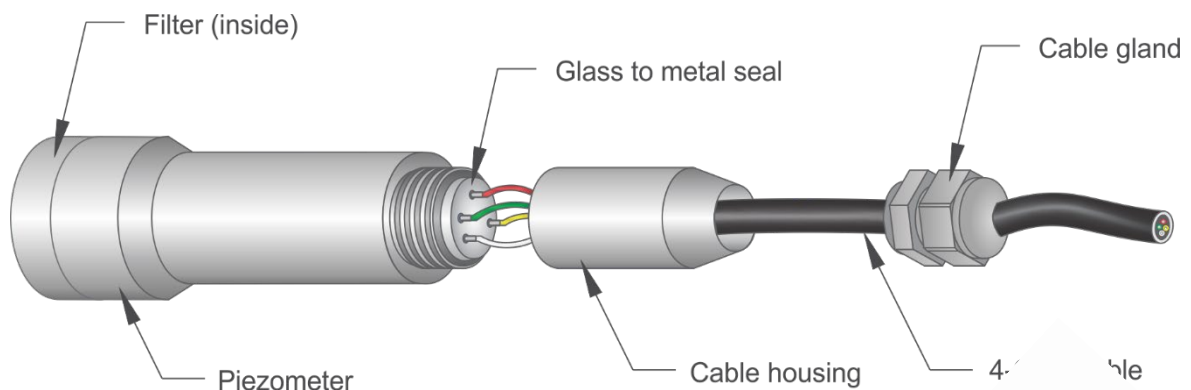
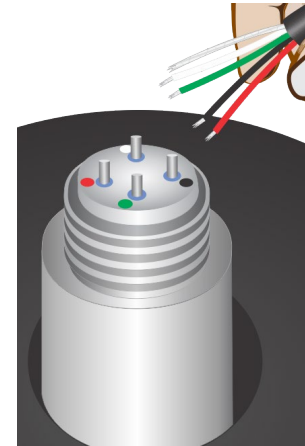


Figure 3.1

NOTE: Encardio-rite model EPP-30V piezometer has been used as an example in figure 3.1. The same instructions are applicable for jointing other sensors.



3.5 Preparation of cable jointing compound and its

application

- 3.5.1 Prepare the cable jointing compound as per instructions provided by the supplier of compound. The jointing compound contains resin and hardener that have to be mixed in a specific proportion given in the instructions.
- 3.5.2 Stir the mixture of resin and hardener thoroughly with a metal/glass rod. The mixed compound should be used within 10 minutes.
- 3.5.3 With the spatula, apply a little of the mixed compound on the glass to metal seal, covering the terminals. Also cover the red, black, green and white cores with the compound.
- 3.5.4 Screw the cable joint housing to the sensor and tighten with your hand.
- 3.5.5 Push the cable to one end of the housing such that there is a gap between the cable and the cable housing for pouring in the compound. This allows the air to pass through from other side.
- 3.5.6 One can also hold/fix the sensor in an inclined position. In case of large sensors like the stress meter, a spacer (~25 mm height) can be put under the front bottom edge to incline the sensor.
- 3.5.7 Using the funnel/syringe, pour the compound in the cable housing till the compound rises from the

upper front side. Pour the compound slowly such that no air gets entrapped inside the cable housing.

- 3.5.8 Slide the cable gland in position and tighten the nut firmly with hand pressure or using spanner 18/19 (suitable for PG-9 gland). The little epoxy that may squeeze out should be wiped off. Re-position the sensor to a vertical position, in case it was in inclined position.
- 3.5.9 The cable joint will be ready for use after 24 hours of potting.
- 3.5.10 With model EDI-51V readout unit check again that the sensor is giving correct reading.

3.6 Cable jointing compound details

- For PVC cable
 - R-pack 3M Scotch Cast 450 resin and hardener MSH 283
- For PU cable
 - 3M Scotch Cast Electrical Kit 2131

Any suitable two component cable jointing compound available in your Country can be used in place of the above mentioned compounds used by us in India. The above two jointing compounds are included in the supplies made in India.

WARNING! Avoid skin and eye contact with the jointing compound. The compound is harmful if swallowed. Hands should be thoroughly washed with soap and water immediately after use. Use of latex gloves is recommended especially if a large number of joints are to be made. Empty jointing compound containers should be destroyed after pouring and should not be used for storing any other material.