



# ENCARDIO RITE

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USERS' MANUAL

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## DATALOGGER WITH INTEGRAL TILT METER

MODEL ESDL-30MT - Addendum



Doc. # WI 6002.110 Addendum R00 | May 2007

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## 1 INTRODUCTION

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Encardio-rite model ESDL-30MT consists of a tilt meter integrated with an automatic datalogger. The unit has biaxial MEMS tilt sensor mounted inside it. It is a complete unit in itself for online monitoring of tilt at any location. It is of rugged construction and can be used in a variety of applications to provide accurate reliable data.

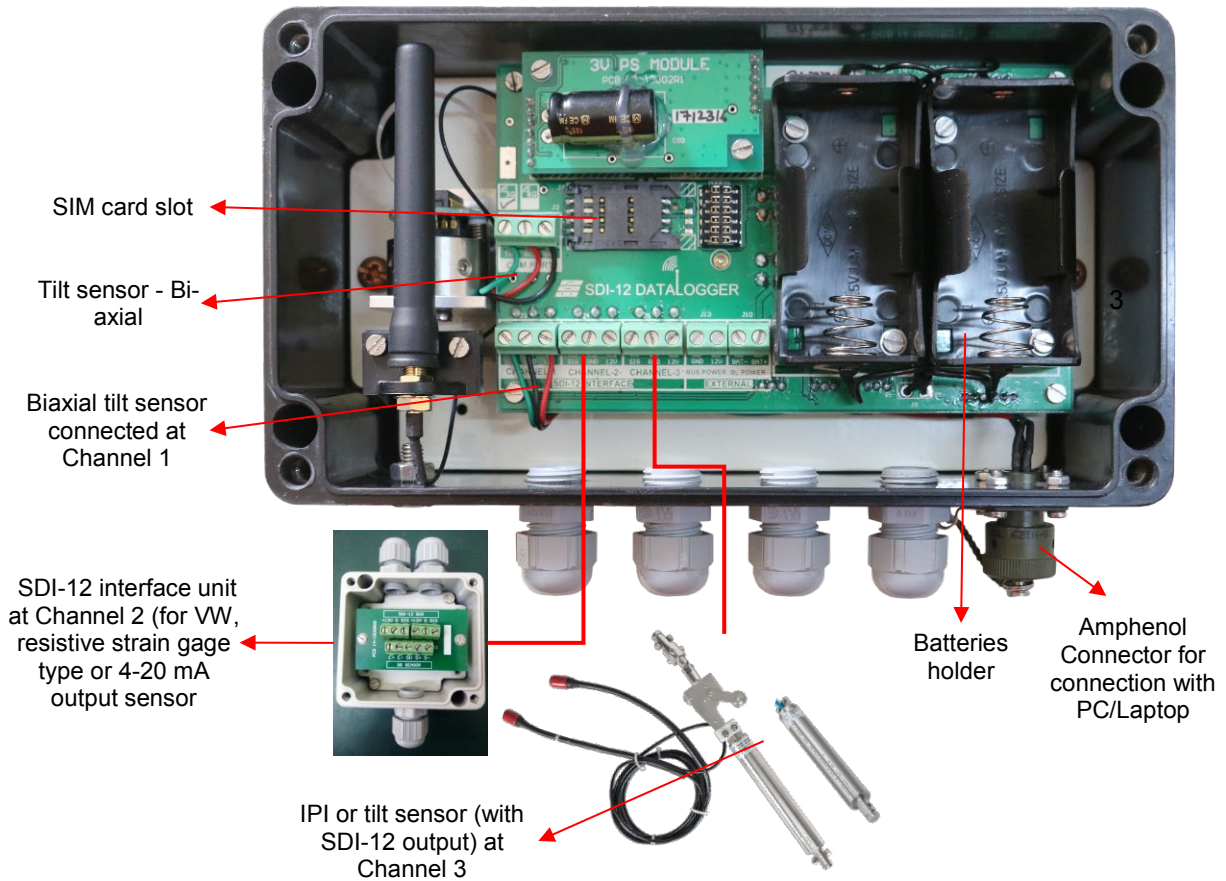
ESDL-30MT datalogger with inbuilt tilt meter also has provision to connect nearby installed crack meter, another tilt meter or any others vibrating wire, resistive strain gage type sensor with SDI-12 interface.

### 1.1 Specifications of inbuilt tilt meter

The inbuilt MEMS tilt meter has a measurement range of  $\pm 15^\circ$  from vertical. It provides a full-scale output of  $\pm 4$  V (nominal) at  $\pm 15^\circ$  and has an accuracy of  $\pm 0.1\%$  fs and sensitivity of  $\pm 10$  arc seconds.

## 2 DESCRIPTION

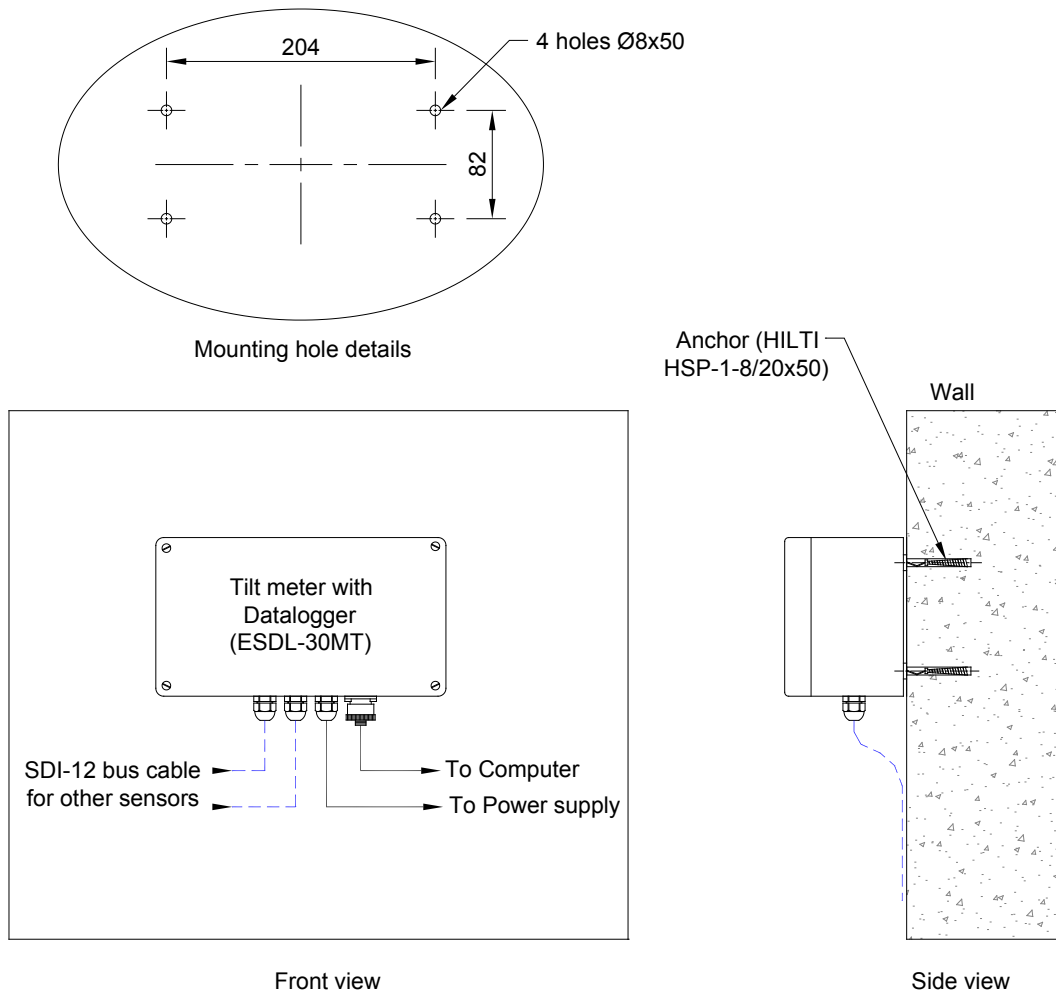
Figure 1 shows model ESDL-30MT datalogger with an inbuilt tilt meter. The biaxial tilt sensor is connected at Channel 1. Channel 2 and Channel 3 can be used for other sensors to measure different parameters. In figure below an interface suitable for vibrating wire, resistive strain gage type or 4-20 mA output sensor is shown connected to channel 2 and an IPI sensor/tilt meter with SDI-12 output is shown connected to channel 3 as an example.



**Figure 1: Details of model ESDL-30MT datalogger with inbuilt biaxial tilt meter**

### 3 INSTALLATION

Typical mounting arrangement of model ESDL-30MT tilt meter (inside datalogger) on wall is shown in figure 2 below. Mounting arrangement of the same may differ depending on the location at which it is being installed. Please contact factory in case any special mounting arrangement is required.



**Figure 2: Installation details of model ESDL-30MT datalogger**

## **4 CONFIGURATION, DATA RETRIEVAL**

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### **4.1 Configuration**

For configuration of ESDL-30MT datalogger with inbuilt tilt meter, please refer to manual # WI 6002.110 for model ESDL-30 datalogger. The configuration is same for both models.

### **4.2 Online data via telemetry transmission through GSM/GPRS modem**

In a location covered by any GSM/GPRS service provider, data from the automatic datalogger can be transmitted remotely to any server/cloud. A data SIM card is required for each datalogger (in customer's scope).

### **4.3 Readout/data retrieval using laptop PC**

The logged data from datalogger installed in field can be directly downloaded to a laptop. Data can be then transferred to central PC or server from the laptop using either a USB pen drive or through Internet.

## 5 PROTECTION

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Avoid installation of tilt meter in parts of the structure exposed to direct sunlight. If this is not feasible, a box made from Thermocole or similar heat insulating material should be installed covering the tilt meter and protecting it from direct sunlight. If certain degree of mechanical protection is also required, wooden or fibreglass protection boxes may be considered. Heat insulating tape can be fixed to the inner surface of such boxes for thermal insulation.

## 6 SAMPLE CERTIFICATE

### TEST CERTIFICATE (for 'A' axis calibration)

Item : SDI-12 datalogger with built in tilt meter (Biaxial)  
 Model : ESDL-30R1 MT  
 Range :  $\pm 15^\circ$  Date : 02.01.2019  
 Serial No. : 1803501 Temperature : 17 °C  
 Next calibration due on : 01.01.2020

#### Test data

| Test position<br>Arc degrees(B) | Corresponding<br>SinA | Observed<br>SinA<br>'A' axis | Offset corrected<br>SinA<br>'A' axis | Non-conformance<br>(% fs)<br>'A' axis |
|---------------------------------|-----------------------|------------------------------|--------------------------------------|---------------------------------------|
| 15                              | 0.2588                | 0.2593                       | 0.2590                               | 0.0695                                |
| 12                              | 0.2079                | 0.2081                       | 0.2079                               | 0.0119                                |
| 9                               | 0.1564                | 0.1567                       | 0.1564                               | 0.0013                                |
| 6                               | 0.1045                | 0.1049                       | 0.1046                               | 0.0211                                |
| 3                               | 0.0523                | 0.0526                       | 0.0523                               | 0.0043                                |
| 0                               | 0.0000                | 0.0003                       | 0.0000                               | 0.0000                                |
| -3                              | -0.0523               | -0.0519                      | -0.0522                              | 0.0483                                |
| -6                              | -0.1045               | -0.1042                      | -0.1045                              | 0.0079                                |
| -9                              | -0.1564               | -0.1560                      | -0.1562                              | 0.0763                                |
| -12                             | -0.2079               | -0.2076                      | -0.2078                              | 0.0292                                |
| -15                             | -0.2588               | -0.2586                      | -0.2588                              | 0.0093                                |

Max non-conformance (% fs): 0.08

Calculation of tilt value (arc degree) :

$$A = \sin^{-1}(\text{observed output})$$

Wiring colour code :

| Wire colour | Signal           | Marking on PCB |
|-------------|------------------|----------------|
| Red         | + 12 V (supply ) | 12V            |
| Black       | 0 V (supply )    | GND            |
| Green       | Output signal    | signal         |

Tested by :

- (1) One no. In-built Biaxial tilt meter has been connected at channel # 1.
- (2) Channel # 2 & 3 are free for other SDI sensors.



**TEST CERTIFICATE**  
(for 'B' axis calibration)

Item : SDI-12 datalogger with built in tilt meter (Biaxial)  
 Model : ESDL-30R1 MT  
 Range :  $\pm 15^\circ$  Date : 02.01.2019  
 Serial No. : 1803501 Temperature : 17 °C  
 Next calibration due on :01.01.2020

**Test data**

| Test position<br>Arc degrees(B) | Corresponding<br>SinA | Observed<br>SinA<br>'B' axis | Offset corrected<br>SinA<br>'B' axis | Non-conformance<br>(% fs)<br>'B' axis |
|---------------------------------|-----------------------|------------------------------|--------------------------------------|---------------------------------------|
| 15                              | 0.2588                | 0.2584                       | 0.2586                               | 0.0808                                |
| 12                              | 0.2079                | 0.2075                       | 0.2077                               | 0.0992                                |
| 9                               | 0.1564                | 0.1560                       | 0.1561                               | 0.1153                                |
| 6                               | 0.1045                | 0.1042                       | 0.1043                               | 0.0693                                |
| 3                               | 0.0523                | 0.0521                       | 0.0523                               | 0.0093                                |
| 0                               | 0.0000                | -0.0002                      | 0.0000                               | 0.0000                                |
| -3                              | -0.0523               | -0.0524                      | -0.0522                              | 0.0378                                |
| -6                              | -0.1045               | -0.1046                      | -0.1045                              | 0.0268                                |
| -9                              | -0.1564               | -0.1567                      | -0.1565                              | 0.0191                                |
| -12                             | -0.2079               | -0.2082                      | -0.2081                              | 0.0561                                |
| -15                             | -0.2588               | -0.2590                      | -0.2589                              | 0.0135                                |

Max non-conformance (% fs): 0.12

Calculation of tilt value (arc degree) :

$$B = \sin^{-1}(\text{observed output})$$

Wiring colour code :

| Wire colour | Signal           | Marking on PCB |
|-------------|------------------|----------------|
| Red         | + 12 V (supply ) | 12V            |
| Black       | 0 V (supply )    | GND            |
| Green       | Output signal    | signal         |

Tested by :

- (1) One no. In-built Biaxial tilt meter has been connected at channel # 1.  
 (2) Channel # 2 & 3 are free for other SDI sensors.