INFORME DE LA INSTRUMENTACIÓ DELS ANELLS PER LA UTE TÚNEL SANT JUST

UTE TÚNEL SANT JUST
OFICINA TÈCNICA
GENER DEL 2009

ÍNDEX

1. INTRODUCCIÓ / ANTECEDENTS

Dins dels treballs contractats dins de l'obra "Complementació de la connexió entre les ETAP d'Abrera i Cardedeu. Tram Fontsanta-Trinitat. Túnel i conducció Fontsanta-Trinitat entre la riera de Sant Just i l'estació distribuidora de Trinitat. Bloc 1", s'ha d'executar la partida referent a la instrumentació dels anells de sosteniment del túnel principal.

L'esmentada instrumentació apareix definida en els documents del projecte original, en concret dins dels plànols, el plec de condicions específiques i el corresponent apartat dins del pressupost del contracte.

Així doncs, en projecte es proposa una instrumentació formada pels següents elements:

- Cél·lula de presió total (CPT) de corda vibrant, adaptada per a la mesura de presions radials i tangencials en contacte del terreny-formigó, amb un rang nominal de 30 kg/cm2. Es disposa una unitat per dovella, per un total de sis dovelles per anell instrumentat (A1, A2, A3, B, C i K).
- Extensómetre de corda vibrant, per a la mesura de deformacions unitàries, de rang de $3x10^{-6}$ m. Es disposen dues unitats per dovella, per un total de sis dovelles per anell instrumentat (A1, A2, A3, B, C i K).

Segons amidaments de plànols i pressupost, es preveu la instrumentació d'un total de set anells per a tot el traçat corresponent al Bloc 1 de l'esmentada obra. La posició dels mateixos quedarà a disposició de les instruccions que doni la Direcció Facultativa, que informarà al contractista de la mateixa per tal que es pugui preveure la seva fabricació i transport a obra.

2. MEMÒRIA

Paralel·lament a la definició de la instrumentació definitiva per als anells de sosteniment, per part de la UTE Túnel Sant Just es presenta una proposta de canvi dins del disseny dels propis anells.

El canvi proposat per part de la UTE Túnel Sant Just és la sustitució de part de l'armadura convencional dimensionada anteriorment, per una quantia determinada de fibres d'acer.

El propòsit de l'esmentada proposta és el de millorar les característiques de resistència i durabilitat dels anells de sosteniment, per tal d'obtenir uns nivells d'acabat òptim en la col·locació dels mateixos. Donat que l'objecte d'aquest informe és el de reportar la instrumentació dels anells, i no la justificació de l'esmentat canvi, deixem una explicació més exhaustiva dels càlculs resistents per a un altre informe elaborat per aquest fi. Simplement esmentar que aquesta justificació de canvi està sent realiltzada conjuntament pels serveis tècnics de la UTE Túnel Sant Just i el Departament d'estructures de la Universitat Politècnica de Catalunya, sota la supervisió de la Direcció Facultativa.

A efectes de la instrumentació dels anells, en una reunió realitzada per part de Aigües Ter - Llobregat (ATLl), Direcció Facultativa, UTE Túnel Sant Just i la Universitat Politècnica de Catalunya (UPC), es decideix d'instrumentar un anell armat amb l'armadura convencional i un anell armat amb la proposta d'armadura mixta (armadura en barres optimitzada i una quantia determinada de fibres d'acer).
L'objectiu d'aquesta instrumentació és la de comparar els comportaments observats per part d'un anell convencional i un anell amb fibres d'acer, i desprendre'n conclusions de cara a l'acceptació del canvi proposat.

El dijous 8 de gener del 2009 es van reunir a les instalacions de Sorigué, subcontractista encarregat de la fabricació de les dovelles, la Direcció Facultativa i la UTE Túnel Sant Just, per tal de definir els criteris de posició i col·locació dels

instruments detallats dintre de les dovelles amb armadura convencional. També van assistir-hi els tècnics de producció i qualitat de Sorigué i els tècnics de Mekano4, contractats pel suministre i la col·locació de la instrumentació. Els detalls de la col·locació de la instrumentació es poden consultar a l'annex de plànols i al reportatge fotogràfic.

Posteriorment, el dimecres 14 de gener de 2009 es va realitzar una segona reunió a les instal·lacions de Sorigué, amb les mateixes parts, acompanyades aquesta vegada per representants de la UPC, per tal de definir la col·locació de la instrumentació de la dovella amb fibres. Donat que en aquest cas l'armadura convencional era menor, es van definir uns barres suplementàries per tal de facilitar el muntatge dels instruments pel cas d'armadura mixta. Cal assenyalar que aquestes barres de muntatge no seran necessàries pels anells no instrumentats. Els detalls de la col·locació de la instrumentació es poden consultar a l'annex de plànols i al reportatge fotogràfic.

Pel que respecte al punt de col·locació dels anells instrumentats, La Direcció Facultativa ha assenyalat que s'hauran de col·locar dins del tram de túnel executat a mitja secció i amb mètode convencional. En la mesura que els terminis de producció ho permetin, s'hauran de col·locar, el més proper que sigui possible, del punt de convergència número sis, situat al PK 3+345. Aquest punt s'ha caracteritzat per tenir uns lleugers assentaments durant l'execució del pretúnel, pel que pot ser un tram on es puguin veure els anells treballant davant de sol·licitacions del terreny.

ANNEX NÚMERO 1: REPORTATGE FOTOGRÀFIC

Figura 1. Extensòmetre de corda vibrant

Figura 2. cèlul·les de presió de corda vibrant

Figura 3. Connexió dels instruments amb la caixa de registre (convencional)

Figura 4. Ubicació dels extensòmetres de corda vibrant (convencional)

Figura 5. Aspecte general de la instrumentació (convencional)

Figura 6. Col·locació de la dovella instrumentada al motllo de formigonat. (convencional)

Figura 7. Armadura convencional optimitzada pel cas de l'anell amb fibres.

Figura 8. Col·locació de la cèl·lula de presió mitjançant barres suplementàries

Figura 9. Muntatge de la caixa de connexió dels instruments, que s'utilitzarà posteriorment per les lectures.

Figura 10. Aspecte general de la instrumentació. (amb fibres)

Figura 11. Col·locació dels extensòmetres de corda vibrant. (amb fibres)

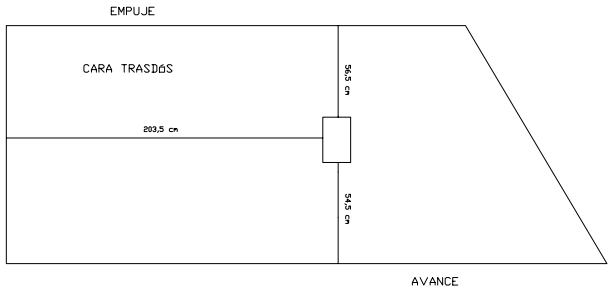
Figura 12. Presa de lectures inicials de la cèl·lula de presió i extensòmetres.

ANNEX NÚMERO 2: PLÀNOLS

ANNEX NÚMERO 3: FITXES TÈCNIQUES

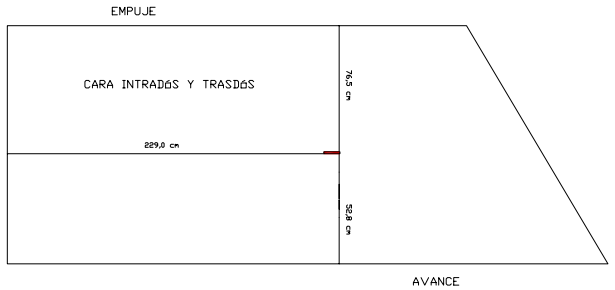
ARMADURA TIPO B

CÉLULA DE PRESIÓN



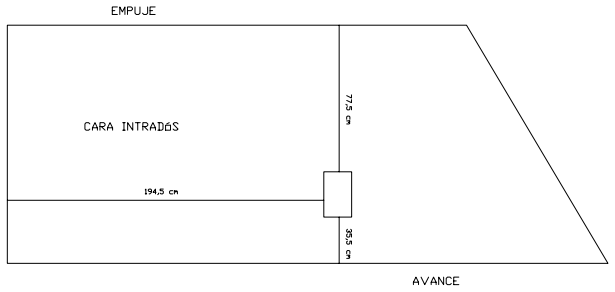
ARMADURA TIPO B

EXTENSÓMETROS



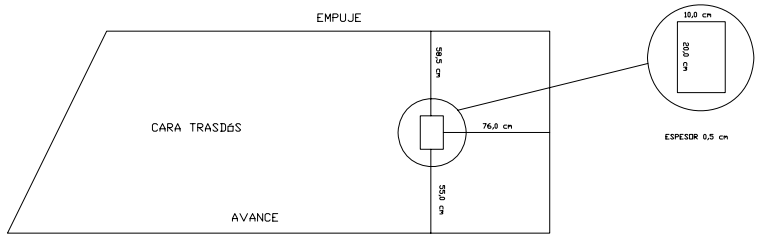
ARMADURA TIPO B

CAJA DE CONTROLES



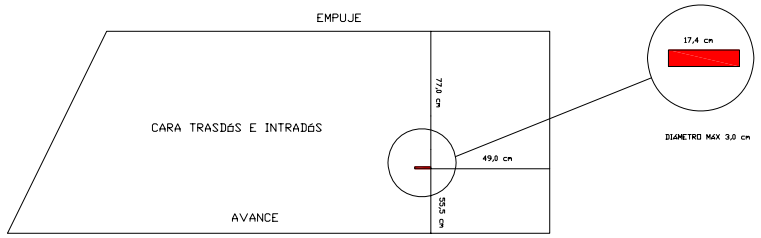
ARMADURA TIPO C

CÉLULA DE PRESIÓN



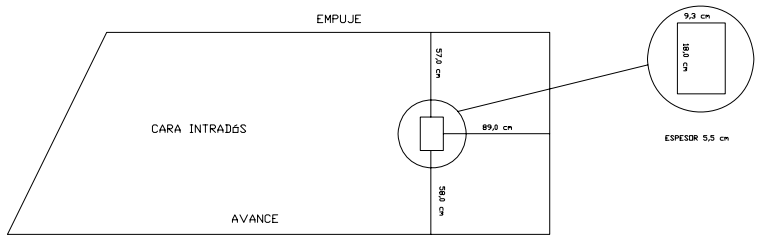
ARMADURA TIPO C

EXTENSÓMETROS



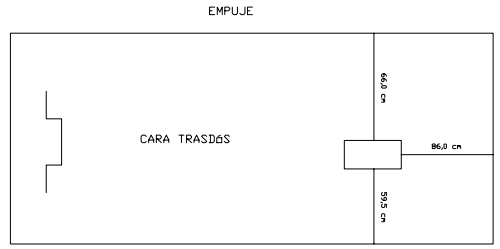
ARMADURA TIPO C

CAJA DE CONEXIÓN



ARMADURA TIPO A1

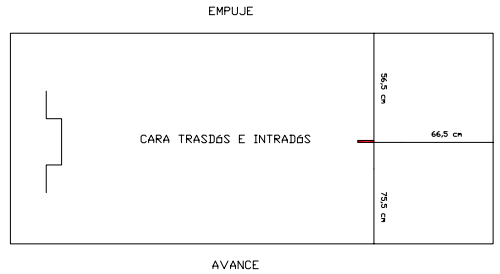
CÉLULA DE PRESIÓN



EN ESTA ARMADURA (A1) SE HA SITUADO LA CÉLULA DE PRESIÓN CON SU LONGITUD MÁXIMA PERPENDICULAR AL SENTIDO DE AVANCE DE LA TUNELADORA

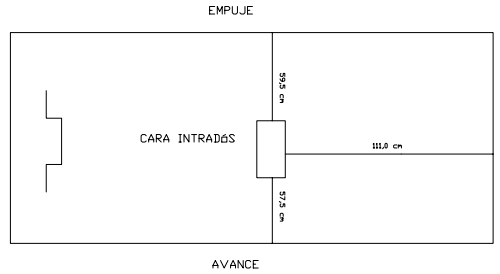
ARMADURA TIPO A1

EXTENSÓMETROS



ARMADURA TIPO A1

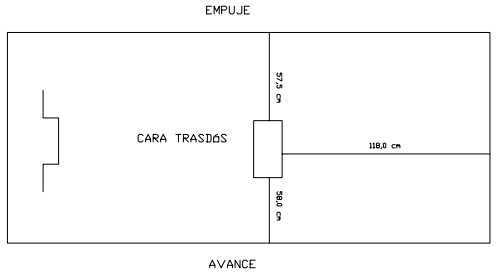
CAJA DE CONEXIÓN



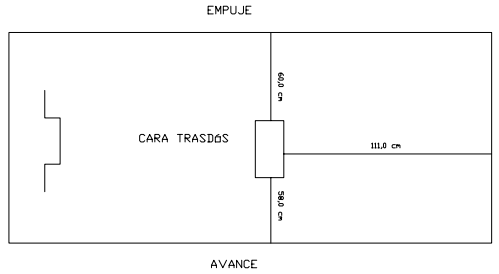
el anillo instrumentado es el 2310 realizado con moldes de la serie 2

UTE TUNEL SANT JUST		TÍTOL DEL PROJECTE PROJECTE DEL TÚNEL I CONDUCCIÓ FONTSANTA – TRINITAT, ENTRE LA RIERA DE SANT JUST I L'ESTACIÓ DISTRIBUÏDORA DE LA TRINITAT	CLAU	ESCALES 0 m ORIGINALS GRÀFIQUES	NOM DEL PLÀNOL: TÚNEL PRINCIPAL INSTRUMENTACIÓ DOVELLES ANELL CONVENCIONAL	DATA: GENER 2009 NOM FITXER: croquis instru.DWG	PLÀNOL NÚM. FULL...1.....DE...2...

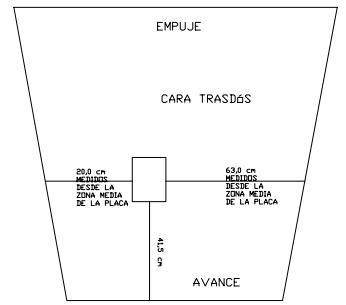
ARMADURA TIPO A2
CÉLULA DE PRESIÓN



ARMADURA TIPO A3
CÉLULA DE PRESIÓN



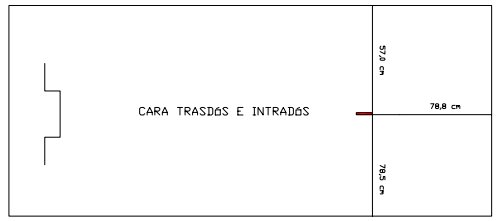
ARMADURA TIPO K
CÉLULA DE PRESIÓN



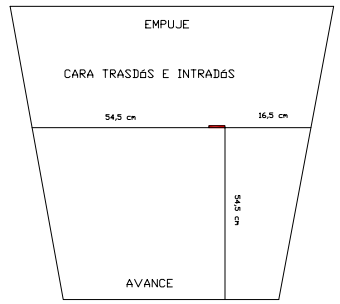
TODAS LAS MEDIDAS DE LA ARMADURA TIPO K SE HAN REALIZADO MIRANDO DESDE LA CARA DEL INTRADÓS

ARMADURA TIPO A2
EXTENSÓMETROS

ARMADURA TIPO A3
EXTENSÓMETROS

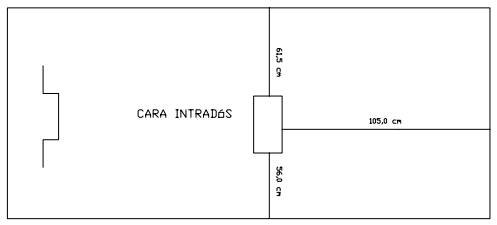


ARMADURA TIPO K
EXTENSÓMETROS

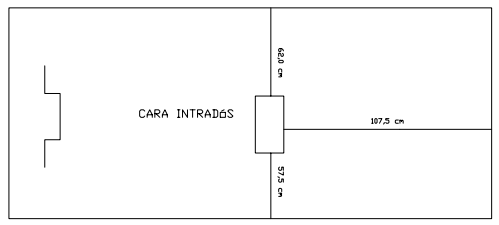


TODAS LAS MEDIDAS DE LA ARMADURA TIPO K SE HAN REALIZADO MIRANDO DESDE LA CARA DEL INTRADÓS

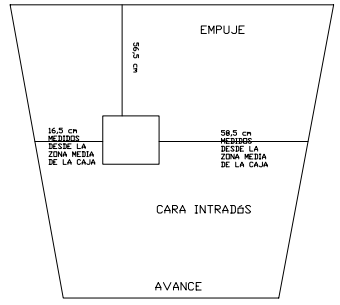
ARMADURA TIPO A2
CAJA DE CONEXIÓN



ARMADURA TIPO A3
CAJA DE CONEXIÓN



ARMADURA TIPO K
CAJA DE CONEXIÓN



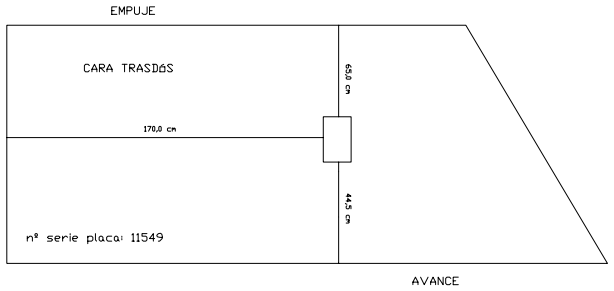
TODAS LAS MEDIDAS DE LA ARMADURA TIPO K SE HAN REALIZADO MIRANDO DESDE LA CARA DEL INTRADÓS

el anillo instrumentado es el 2310 realizado con moldes de la serie 2

UTE TUNEL SANT JUST		**TÍTOL DEL PROJECTE** PROJECTE DEL TÚNEL I CONDUCCIÓ FONTSANTA – TRINITAT, ENTRE LA RIERA DE SANT JUST I L'ESTACIÓ DISTRIBUÏDORA DE LA TRINITAT	**CLAU**	**ESCALES** 0 m **ORIGINALS** **GRÀFIQUES**	**NOM DEL PLÀNOL:** TÚNEL PRINCIPAL INSTRUMENTACIÓ DOVELLA ANELL CONVENCIONAL	**DATA:** GENER 2009 **NOM FITXER:** croquis instru.DWG	**PLÀNOL NÚM.** **FULL...2.....DE...2...**

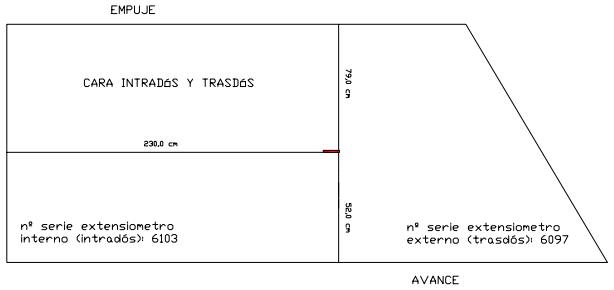
ARMADURA TIPO B

CÉLULA DE FUERZA



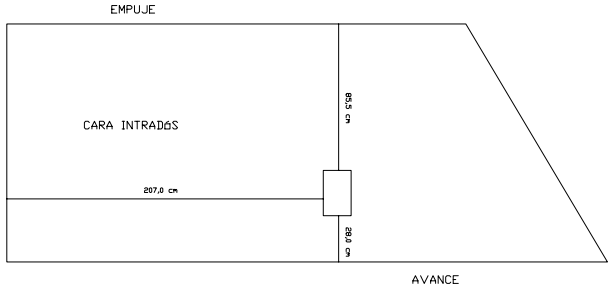
ARMADURA TIPO B

CÉLULA EXTENSIOMETRICA



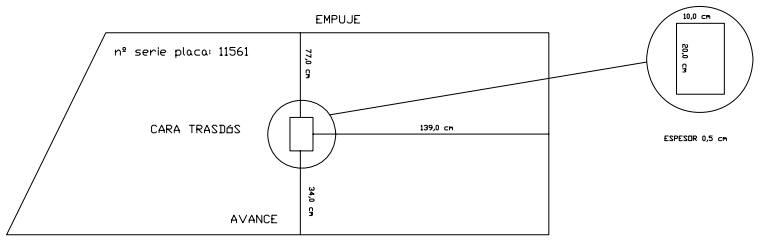
ARMADURA TIPO B

CAJA DE CONTROLES



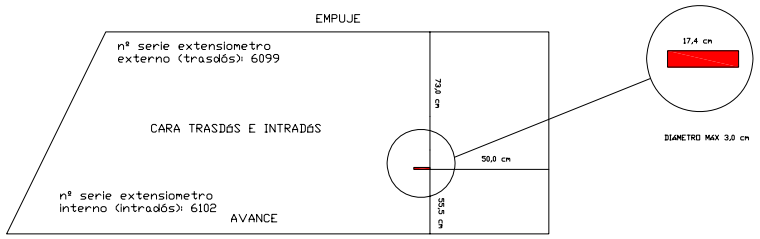
ARMADURA TIPO C

CÉLULA DE FUERZA



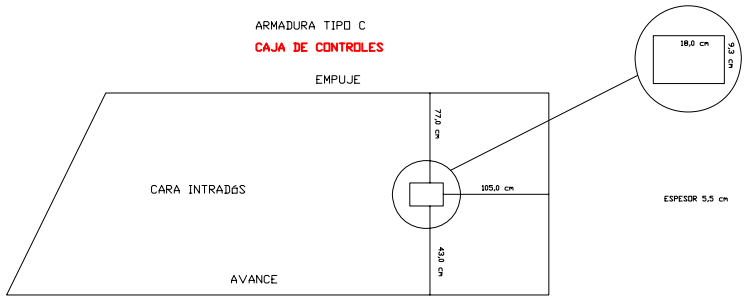
ARMADURA TIPO C

CÉLULA EXTENSIOMETRICA



ARMADURA TIPO C

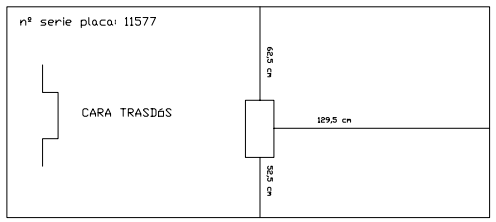
CAJA DE CONTROLES



ARMADURA TIPO A1

CÉLULA DE FUERZA

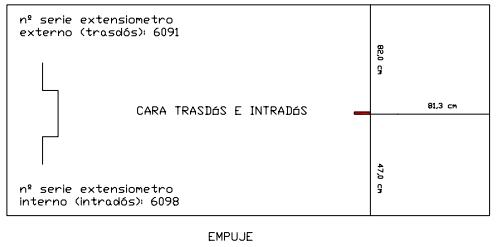
AVANCE ← OJO es distinto a las otras



ARMADURA TIPO A1

CÉLULA EXTENSIOMETRICA

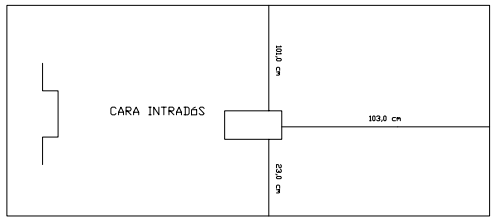
AVANCE ← OJO es distinto a las otras



ARMADURA TIPO A1

CAJA DE CONTROLES

AVANCE ← OJO es distinto a las otras

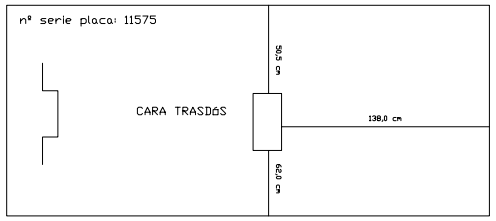


FCC CONSTRUCCION COPISA UTE TUNEL SANT JUST		TÍTOL DEL PROJECTE PROJECTE DEL TÚNEL I CONDUCCIÓ FONTSANTA – TRINITAT, ENTRE LA RIERA DE SANT JUST I L'ESTACIÓ DISTRIBUÏDORA DE LA TRINITAT	CLAU	ESCALES 0 m ORIGINALS GRÀFIQUES	NOM DEL PLÀNOL: TÚNEL PRINCIPAL INSTRUMENTACIÓ DOVELLES ANELL AMB FIBRES	DATA: GENER 2009 NOM FITXER: croquis instru.DWG	PLÀNOL NÚM. FULL...1.....DE...2...

ARMADURA TIPO A2

CÉLULA DE FUERZA

EMPUJE

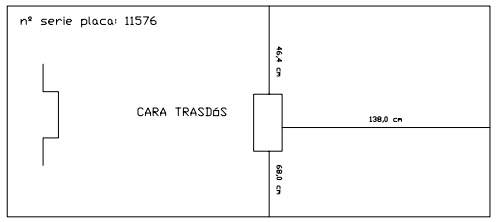


AVANCE

ARMADURA TIPO A3

CÉLULA DE FUERZA

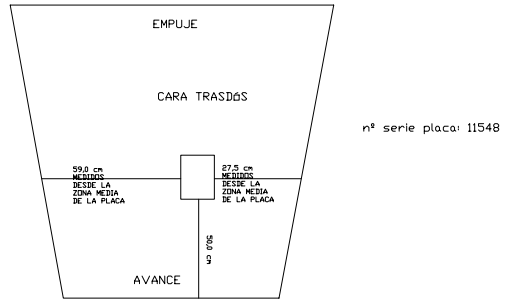
EMPUJE



AVANCE

ARMADURA TIPO K

CÉLULA DE FUERZA

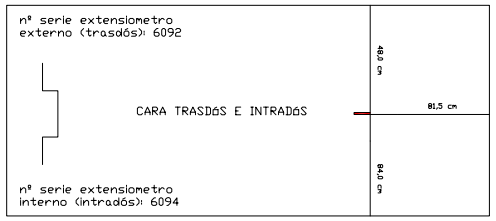


TODAS LAS MEDIDAS DE LA ARMADURA TIPO K SE HAN REALIZADO MIRANDO DESDE LA CARA DEL INTRADÓS

ARMADURA TIPO A2

CÉLULA EXTENSIOMÉTRICA

EMPUJE

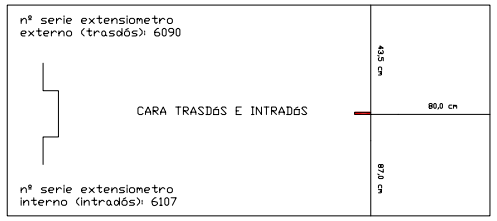


AVANCE

ARMADURA TIPO A3

CÉLULA EXTENSIOMÉTRICA

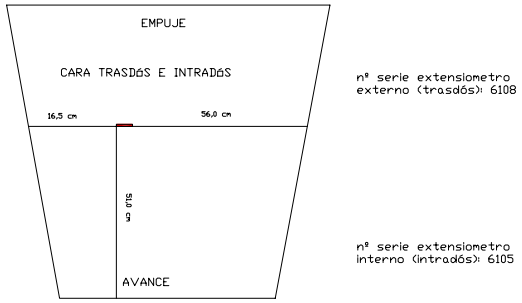
EMPUJE



AVANCE

ARMADURA TIPO K

CÉLULA EXTENSIOMÉTRICA

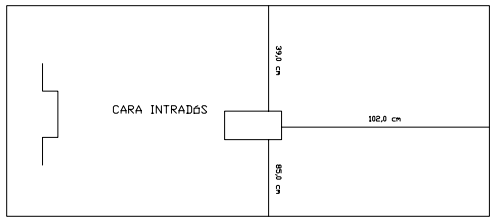


TODAS LAS MEDIDAS DE LA ARMADURA TIPO K SE HAN REALIZADO MIRANDO DESDE LA CARA DEL INTRADÓS

ARMADURA TIPO A2

CAJA DE CONTROLES

EMPUJE

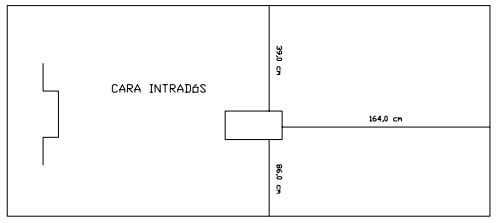


AVANCE

ARMADURA TIPO A3

CAJA DE CONTROLES

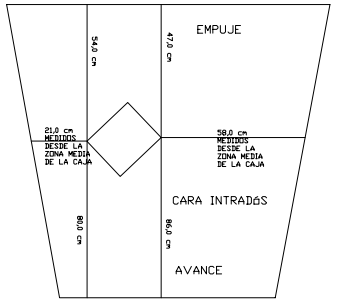
EMPUJE



AVANCE

ARMADURA TIPO K

CAJA DE CONTROLES



TODAS LAS MEDIDAS DE LA ARMADURA TIPO K SE HAN REALIZADO MIRANDO DESDE LA CARA DEL INTRADÓS

FCC CONSTRUCCION COPISA UTE TUNEL SANT JUST		TÍTOL DEL PROJECTE PROJECTE DEL TÚNEL I CONDUCCIÓ FONTSANTA – TRINITAT, ENTRE LA RIERA DE SANT JUST I L'ESTACIÓ DISTRIBUÏDORA DE LA TRINITAT	CLAU	ESCALES 0 m ORIGINALS GRÀFIQUES	NOM DEL PLÀNOL: TÚNEL PRINCIPAL INSTRUMENTACIÓ DOVELLES ANELL AMB FIBRES	DATA: GENER 2009 NOM FITXER: croquis instru.DWG	PLÀNOL NÚM. FULL...2.....DE...2...

ENCARDIO RITE

SHOTCRETE & CONCRETE PRESSURE METER

MODEL ESC-30V

INTRODUCTION

The 'New Austrian Tunneling Method', or N.A.T.M., calls for the support of a tunnel by the rapid application of shotcrete to the freshly exposed ground. The theory behind this method of support, particularly useful in weaker grounds, is that if the inherent strength of the ground can be preserved, it will be almost self-supporting and will require much less artificial support in the form of concrete or steel.

Proper evaluation of total stress may help in:

- The adequacy of the shotcrete lining, indicating the need for perhaps more or less shotcrete to maintain stability.
- Verifying design assumptions that will promote safer and more economical design and construction.

SHOTCRETE-CONCRETE STRESS CELL

Shotcrete-concrete stress cells are designed for the measurement of radial and tangential stresses in shotcrete tunnel linings. They are often used in conjunction with the EDS-80 Tape extensometer and EDS-64 Bore hole extensometer to measure:

- The performance of the lining and
- To determine whether the lining is thick enough to maintain stability.
- Suffix 'C': for use in concrete.

DESCRIPTION OF EQUIPMENT

The Encardio-rite N.A.T.M. style shotcrete concrete stress cells basically consists of a flat rectangular capsule and a pressure transducer connected to each other by a 6 mm ϕ x 165 mm long stainless steel tube. The rigidity of the cell exceeds 50,000 MPa and ensures it will respond immediately and accurately to the onset of increasing concrete stresses.

FEATURES

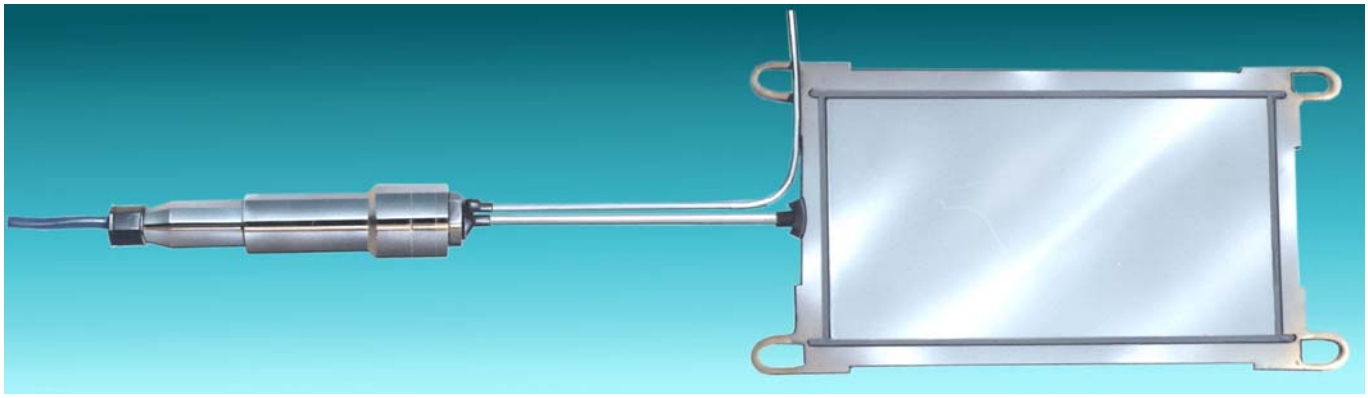
- Rugged, waterproof all stainless steel construction for high reliability.
- Remote filled for high rigidity, accurate and fast response.
- Vibrating wire sensor assures long term stability quick and easy readout.
- Pinch tube for re-inflation in concrete.
- Readily adaptable to data loggers.

APPLICATIONS

- Radial and tangential stresses in shotcrete tunnel linings.
- Assess the adequacy of shotcrete lining.
- Mine backfill monitoring.
- Pressure on and within lining of underground excavations.
- Evaluating foundation bearing pressures.
- Stress in the rockwalls of unlined caverns

Fluid filled pressure cells

The Encardio-rite model ESC-30V shotcrete-concrete cells comprises of two rectangular plates welded round the edge. The narrow gap between plates is filled with fluid using a special process which ensures that all the air is excluded.



Vibrating wire transducer

The stainless steel pressure transducer is 42 mm ϕ x 190 mm long. It incorporates the vibrating wire, the coil magnet assembly and the cable joint housing. Each pressure cell is individually temperature compensated to 0.03%/^{0}C

Lugs

Lugs are provided at the corners of the rectangular plates to facilitate holding the cell in plane while the shotcrete is applied.

Pinch tube

One end of a 600 mm long pinch tube filled with fluid is welded to the pressure cell. The other end is capped by welding. During concrete lining, temperatures very often rises and causes the capsule to expand in the still green concrete. On cooling, the capsule contracts, which, if allowed to remain, would prevent the transmission of pressures from the concrete to the cell. The purpose of the pinch tube is to inflate the capsule after the concrete around it has fully cured and has cooled off to the ambient temperature. A set of pliers is used to squeeze the fluid in the pinch tube. The fluid is forced out of the tube into the capsule which expands until the gap is eliminated

OPERATING PRINCIPLE

Increase in stress in the concrete causes a corresponding rise in the fluid pressure as the steel plates are squeezed together. The change in fluid pressure is sensed by the specially built Encardio-rite vibrating wire pressure cell and is converted to an electrial signal which is transmitted as a frequency signal to raed out unit. The pressure cell basically consists of a magnetic, high tensile strength stretched wire, one end of which is anchored and the other end fixed to a diaphragm which deflects in some proportion to the applied pressure. Any deflection of the diaphragm changes the tension in the wire, thus affecting the resonant frequency of the vibrating wire. The resonant frequency with which the wire vibrates can be accurately measured by a conventional vibrating wire readout unit.

SPECIFICATIONS

Model	ESC-30V-X
Transducer type	Vibrating wire
Range (MPa)	1.0, 2.0, 3.5, 5.0, 10.0, 20.0, specify
Size (pressure pad)	100 x 200 mm^2, 150 x 250 mm^2, 200 x 300 mm^2, specify
Accuracy[1]	± 0.5 % fs (standard) ± 0.1 % fs (available on request)
Temperature limit	
Operational	-20 to 70^{0}C
Compensated	0 to 55^{0}C
Over range limit	150 % of range
Over range effect	± 0.1% fsd upto 120%
Read out	Portable strain indicator
Enclosure	Stainless steel
Thermistor	YSI 44005 or equivalent (3 kOhms at 25^{0}C)

Note[1] Calibrated accuracy of pressure transducer, with our EDI-51V portable read-out unit.

ORDERING CODE

Model ESC-30V-X-Y

- Y: Size of pressure pad (in mm^2)
- X: Range (in MPa)

All specifications subject to change without prior notice.

ENCARDIO-RITE ELECTRONICS PVT. LTD.

A-7 Industrial Estate, Talkatora Road, Lucknow, UP-226011, India

Tel +91 (522) 2661044 Fax +91 (522) 2661043 E-mail sales@encardio.com

Visit us at: www.encardio.com

ENCARDIO RITE

VIBRATING WIRE STRAIN GAGE

Series EDS-20V strain gage

INTRODUCTION

The Encardio-rite strain gage consists of two components – a basic gage and a sensor assembly. The basic gage incorporates a high tensile strength wire made of a magnetic material stretched between two stainless steel cylindrical end blocks. The wire is sealed in a stainless steel tube by a set of double “O” rings fixed on each end block, ensuring to a great extent resistance to corrosive, humid, wet and other hostile environmental conditions. The sensor houses a permanent magnet and a plucking coil assembly. The wire when plucked by the sensor vibrates at its natural frequency that is proportional to the tension in the wire. Any change in strain, directly effects the tension in the wire, resulting in a corresponding change in its frequency of vibration. The strain is proportional to the square of the frequency that can be measured and displayed directly in m strain by Encardio-rite’s EDI-51V vibrating wire indicator.

Main purpose of the strain gage, is to indirectly determine stress and its variation with time, quantitatively. Change in stress is revealed simply by multiplying the measured strain by the modulus of elasticity.

Following type of strain gages to suit different applications are available:

EDS-20V-S spot weldable

A stainless steel foil tab fixed to each end block enables the gage to be spot-welded or fixed in place by epoxy. The gage is pre-tensioned by a small compression spring. Initial tension can be set during installation, allowing for maximum range in tension or compression as required. The sensor assembly is encapsulated in a moulded protective cover. If gages are accessible, the same sensor can be used from gage to gage for taking the readings. In other installations, the sensor is permanently fixed to the structure by a spot-weldable clamp. The gage is designed for flat surfaces.

EDS-20V-SW spot weldable water proof gage

For locations subjected to dripping or running water, or submerged in water, a more reliable water proof strain gage is required. EDS-20V-SW spot weldable strain gage (suffix W denotes water proof version) is provided with a single part sensor coil rectangular housing suitable for mounting directly over the strain gage and completely enclosing it forming a watertight enclosure. A pair of clamps positioned between the pair of embossed locating points over the sensor coil housing are spot welded to secure the housing to the substrate.

Specifications EDS-20V-S/SW

- Active gage length — 50.8 mm
- Max. strain range — 3,000 μ strain
- Initial frequency — 1,925 - 2,325 Hz
- Effective gage factor — 3.896×10^{-4} μ strain/Hz^2
- Gage l x b x h — 62 x 12.5 x 7.5 mm
- Thermistor type — YSI 44005 or equivalent (3,000 Ohm at 25°C)
- Cable — 4 conductor shielded - one meter

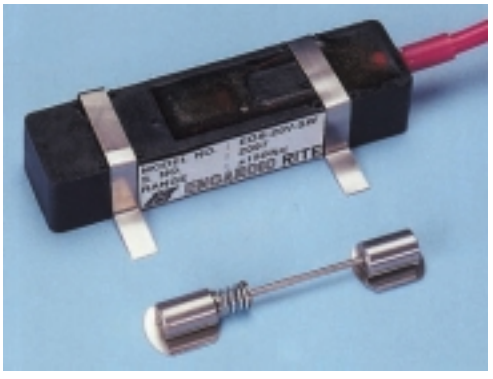
FEATURES

- Accurate, robust and low cost.
- Long term stability with high reliability.
- Easy installation.
- Stainless steel construction.
- Frequency signal can be transmitted over long distance.
- Temperature monitoring by thermistor

APPLICATIONS

- Monitoring of strain in dams and concrete structures during and after construction.
- Study of stress distribution in the under ground cavities and tunnels.
- Stress distribution in concrete and masonry dams.
- Monitoring of stresses in pressure shafts.

EDS-20V-S (Overall size 71 X 28 X 22 mm)



EDS-20V-SW (Overall size 87 X 22 X 18 mm)

EDS-20V-A arc weldable strain gage

Encardio-rite model EDS-20V-A basically consists of two end pieces joined by a tube that encloses a length of magnetic, high tensile strength stretched wire. The wire is sealed in the tube by a set of double 'O' rings fixed on each end piece. The double 'O' ring seals suitably protect the strain gage against ingress of water.The tube is flattened in the middle to accommodate a sensor assembly in the constriction. The sensor used is the same as in EDS-20V-S excepting that a snap in bracket replaces the sensor coil guide.

To mount the strain gage two annular mounting blocks are accurately positioned and aligned by a dummy gage and welded to the structure. The dummy gage is then finally replaced by the actual strain gage and clamped in position by a pair of set screws on each block. Groutable reinforced bar annular mounting blocks are available for surface mounting the strain gage to a concrete structure.

EDS-20V-AW arc weldable strain gage

Encardio-rite model EDS-20V-AW vibrating wire strain gage is basically similar to the arc weldable strain gage except for the extra waterproofing provided on the strain gage and the sensor to prevent ingress of water. The sensor is not detachable and forms an integral part with the strain gage. The strain gage is better suited for locations subjected to dripping or running water or which may submerge in water.

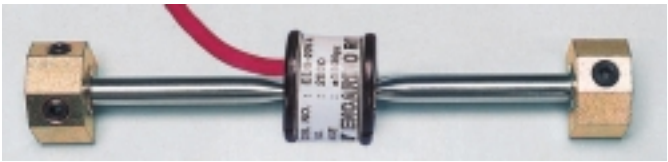
EDS-20V-E embedment type strain gage

Encardio-rite model EDS-20V-E vibrating wire strain gage is designed to measure strain in underground cavities, tunnels, buildings, concrete and masonry dams etc. The strain gage is suitable for embedment in soil or concrete. The embedment strain gage is similar to the arc weldable strain gage except for the following:

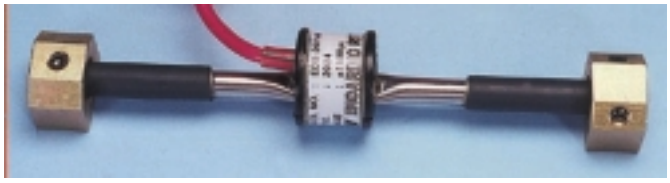
- Extra water proofing is provided on the strain gage and sensor to prevent ingress of water.
- The sensor is not detachable & forms an integral part with the strain gage.
- Mounting blocks are replaced with stainless steel flanges.

Specifications EDS-20V-A/W

Effective gage factor	4.051×10^{-3} µ strain/Hz^2
Strain gage	± 1500 µ strain
Thermistor	YSI 44005 or equivalent (3,000 Ohm at 25°C)
Cable	4 conductor shielded - 1 m
Read out	EDI-51V strain indicator
Accessories	Spare mounting blocks - weldable or groutable Installation kit including two each dummy gages, allen keys and grub screws



EDS-20V-A (Overall size 165 x 28.5 x 30 mm)



EDS-20V-AW (Overall size 180 x 28.5 x 30 mm)

Specifications EDS-20V-E

Effective gage factor	4.051×10^{-3} µ strain/Hz^2
Strain gage	± 1500 µ strain
Thermistor	YSI 44005 or equivalent
Cable	4 conductor shielded
Read out	EDI-51V strain indicator

EDS-20V-E (Overall size 170 x 28.5 x 30 mm)

Note: Hermetically sealed, electron beam welded strain gage model EDS-11V is also availabe. Refer data sheet # 1092-01 PD

ENCARDIO-RITE ELECTRONICS PVT. LTD.

A-7 Industrial Estate, Talkatora Road, Lucknow, UP 226001, India

Tel +91 (522) 416459 Fax +91 (522) 418968 E-mail sales@encardio.com

Visit us at: www.encardio.com

the zero reading of the sensor may be set in any intermediate position.

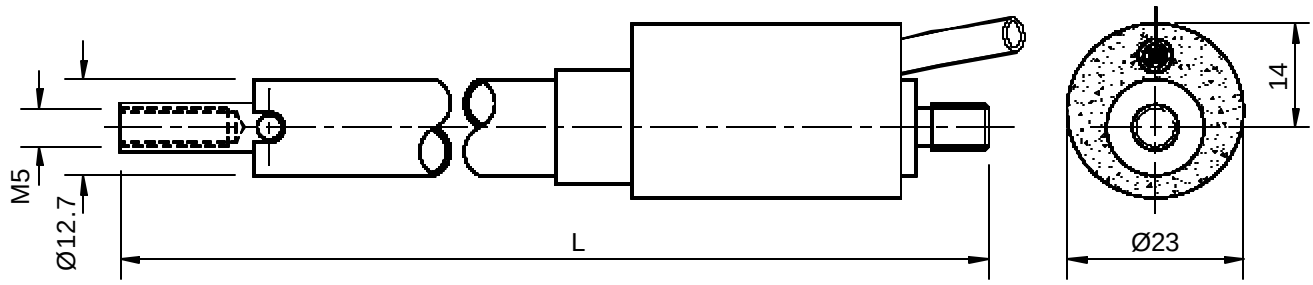
For use as a crackmeter, the EDE-VXX transducer is provided with spherical bearing joints at the two ends and anchors for fixing the joint rods to brick, concrete or rock surfaces.

The retractable shaft of model EDE-VXX vibrating wire displacement transducer has a 12 mm long M5 x 1 female thread.

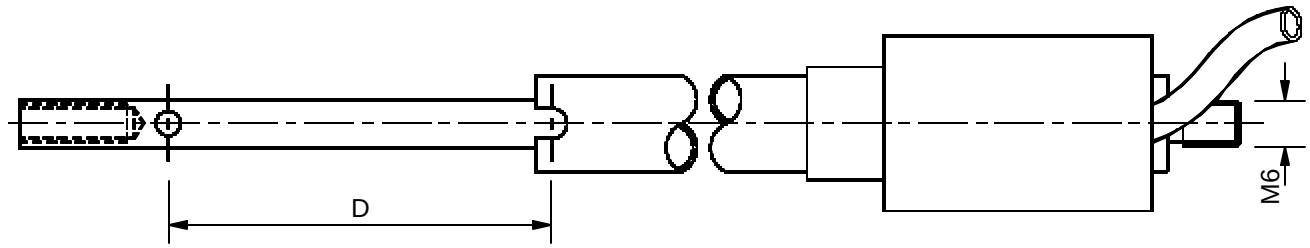
SPECIFICATIONS

Model	EDE-VXX (EDE-V05/10/15)
Range	50, 100, 150 mm respectively
Transducer type	Vibrating wire
Sensitivity	0.02 % fs
Accuracy	0.2% fs
Linearity	0.5 % fs
Operating temp.	-10 to 50°C

DIMENSIONS



END VIEW



All dimensions are in mm

Model no.	Displacement (D)	L
EDE-V05	50 mm	270 mm
EDE-V10	100 mm	400 mm
EDE-V15	150 mm	530 mm

Specifications are subject to change without notice.

ENCARDIO-RITE ELECTRONICS PVT. LTD.

A-7 Industrial Estate, Talkatora Road, Lucknow, UP 226011, India

Tel +91 (522) 2661044 Fax +91 (522) 2661043 E-mail sales@encardio.com

Visit us at: www.encardio.com

ENCARDIO RITE

VIBRATING WIRE INDICATOR

MODEL EDI-51V

OVERVIEW

Encardio-rite model EDI-51V vibrating wire indicator is a micro-processor based unit which can be used with any Encardio-rite vibrating wire sensor. The indicator can display the measured frequency in terms of time period, frequency, frequency squared or the value of measured parameter directly in proper engineering units. For sensors provided with an internal YSI 44005 or equivalent 3 kOhms thermistor, the sensor temperature can be displayed directly in °C.

FEATURES

- Robust, easy to operate and low cost.
- Can display measured frequency in terms of time period, frequency, frequency squared or directly in proper engineering units.
- Storage facility for calibration coefficients of up to 500 sensors.
- Data storage for either around 4500 readings from any one sensor or about 9 sets of readings from all the 500 sensors.
- Provides non-linearity correction using polynomial constants.
- RS-232C serial output to connect IBM compatible PC or serial printer.
- Powered with an internal 6 V rechargable VRLA battery.

Model EDI-51V indicator can store calibration coefficients of maximum 500 number of sensors. It has capacity to store either 4500 readings from any one sensor or about 9 sets of readings from all 500 sensors. Each reading is stamped with date and time at which the measurement was taken.

The stored readings can either be uploaded to a host computer or printed out on any text printer using the serial interface. The uploading can be done using any common unitext software like Hyperterminal. The data can also be processed on any common available spreadsheet like Microsoft Excel.

An internal 6 V rechargeable sealed maintenance free (VRLA) battery is used to power the indicator. A separate compatable external universal 95 to 270 V AC input battery charger is provided with the EDI-51V indicator to charge the internal battery from AC mains.

The indicator is housed in a splash proof plastic molded enclosure with weather proof connectors for making connections to the sensor and battery charger.

TECHNICAL SPECIFICATIONS

Input

Suitable for input from all Encardio-rite make two wire vibrating wire transducers with 110 to 150 Ohm (nominal) sensor coil. Input from equivalent sensors of other manufacturers is also acceptable.

Thermistor input from sensors provided with integral 3kW (@ 25°C) R-T curve matched YSI 44005 or equivalent thermistor for temperature sensing.

Excitation

Swept frequency excitation, 5 V (typical) peak to peak square wave.

Frequency measurement

Range: 500 Hz - 5 kHz

Measurement time: 128 cycles.

Measured parameter: Time period

Resolution: 0.01 micro-seconds (in time period display mode)

Accuracy: Period measurement ±(0.006% of reading + 0.004 micro-sec.)

Displayed parameters: Time period, frequency, frequency squared and engineering units.

Temperature measurement

(Only for sensors provided with 3 kOhm thermistor)

Measurement range: -20 to +100°C.

Resolution: 1°C

Display

LCD dot matrix alphanumeric display. 16 characters x 1 line. Red led provided for battery low indication.

Keyboard

16 key environmentally sealed membrane keypad. Keys are multiple function. Primary key function and numerical values are marked on keys.

Engineering units display

Standard units are ue (micro-strain), ksc (kg/cm^2.), kg, t, mm, m, C and deg.

Environment

Operating temperature range: 0 to 45 °C

Operating humidity range: 10% to 90% (no condensation)

Memory

64 kB non volatile NVRAM (data memory).

Data memory provides non volatile storage for 500 sensors calibration constants and 4500 sets of time stamped data readings. Each data set consists of one parameter reading and corresponding temperature reading (for VW sensors with integral thermistor sensors only) together with date & time data was stored.

Real time clock

A real time clock is provided for time and date stamping of stored data.

RTC time keeping accuracy: ± 2 minutes/month, typical, over the operating temperature range with indicator powered on.

RS-232C serial port

RS-232C serial output is provided to connect the indicator to a serial printer or IBM compatible PC equipped with a RS232C serial interface port.

Baud rate: 2400 baud fixed.

Format: 1 start bit, 8 data bits, no parity and one stop bit.

Data file uploaded to computer is in comma delimited ASCII text file format acceptable to most third party software.

Diagnostics

Power On Self Test plus additional diagnostic utilities are provided.

Power supply

Internal rechargeable 6 V 4Ah VRLA lead acid battery.

A compatable external universal 95 to 270 V AC input 7 V DC output battery charger is supplied with the indicator for charging the batteries.

Input/output connectors

Circular splash proof 7-pin connector for sensor input & RS-232C serial interface port (combined) & 3-pin connector for battery charger.

Housing

ABS + PU impact resistant plastic moulded housing. Dimensions: 277 mm (W) ´ 248 mm (H) ´ 70 mm (D).

(Above specifications are valid for version 5.0 upwards)

Specifications are subject to change without notice.

ENCARDIO-RITE ELECTRONICS PVT. LTD.

A-7 Industrial Estate, Talkatora Road, Lucknow, UP-226011, India

Tel +91 (522) 2661040, 2661039 Fax +91 (522) 2661043 E-mail sales@encardio.com

Visit us at: www.encardio.com