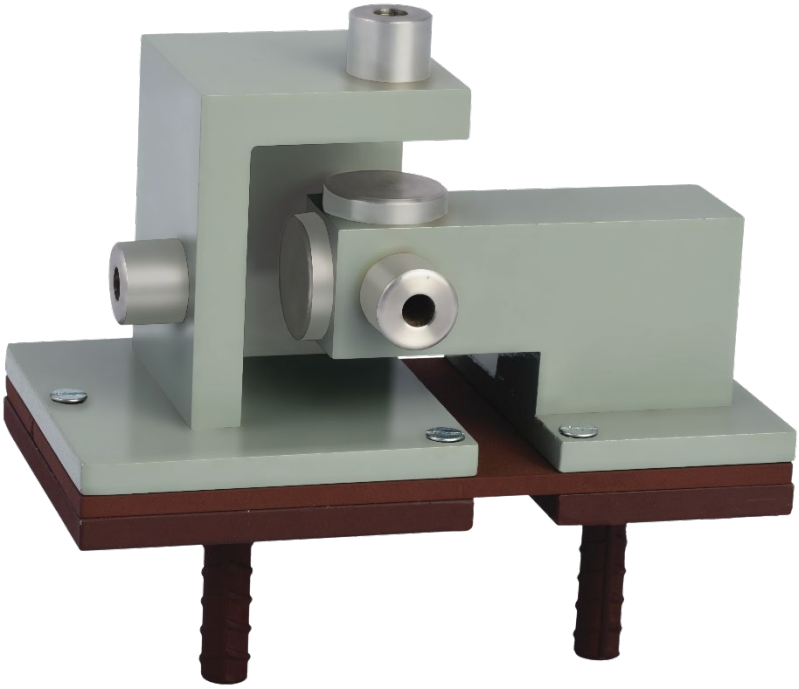
ENCARDIO RITE
METASENSING FOR MEGA STRUCTURES

USERS' MANUAL

MECHANICAL TRIAXIAL CRACK/JOINT METER

MODEL EDJ-40TJ



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1 INTRODUCTION

The Encardio-rite model EDJ-40TJ mechanical triaxial crack/joint meter is designed to measure displacement/movement across joints in X, Y & Z directions such as the joint opening between two concrete/masonry blocks in a dam. It is also used for monitoring of cracks and for displacement in concrete structures, rocks, bridges and pavement slabs, etc.

Surface crack/joint measurements can be made either on the surface or at locations accessible from galleries. The measurement is made by fixing reference points, one on either side of the joint and accurately measuring distance between the two points mechanically or electronically at certain intervals. Full reliance should not be placed on surface measurement. It should be recognized that all parts of a joint do not open at the same time, nor even the same amount. Thus, most information on the joint opening is gained from internally located joint meters. In some cases, where knowledge of shearing movement is desired, surface measurements can be made to advantage where joints are accessible in galleries.

1.1 Description of model EDJ-40TJ triaxial joint meter

The model EDJ-40TJ triaxial joint meter for surface measurement consists of two precision machined elements attached to reinforce bar anchor stems. The precision elements are made of aluminum and are epoxy painted to make it corrosion proof. The micrometer rest blocks and mounting buttons are of stainless steel. The ranges available in model EDJ-40TJ joint meter are ± 15 mm and ± 25 mm in XYZ direction.

The measurement is made by anchoring the two elements on either side of the joint or on the two adjoining concrete blocks where the movement has to be observed. Both the elements should be mounted with a gap of approximately 15 mm/25 mm between them. The complete setup of the triaxial joint meter is shown in figure 1. The change in distance between them is accurately measured over a period of time. The displacement is measured by a micrometer depth gage of 50 mm range and 0.01 mm resolution.

1.2 Location for Installation

The civil contractor is responsible for giving the list of locations (northing, easting & elevation) where the mechanical triaxial joint meter is to be installed in the structure, as per the construction/installation schedule.

If triaxial joint meter is to be installed in a dam's gallery then a niche of dimensions 500 mm x 700 mm x 500 mm (l x b x h) as shown in figure 1 should be constructed prior to the installation.

1.3 Training

Personnel involved in installation and monitoring are professionally trained at the factory to have:

a A background of good installation and monitoring practices.

b Knowledge of the fundamentals of geotechnics.

c An understanding of the intricacies involved, which may seem apparently minor but must not be ignored

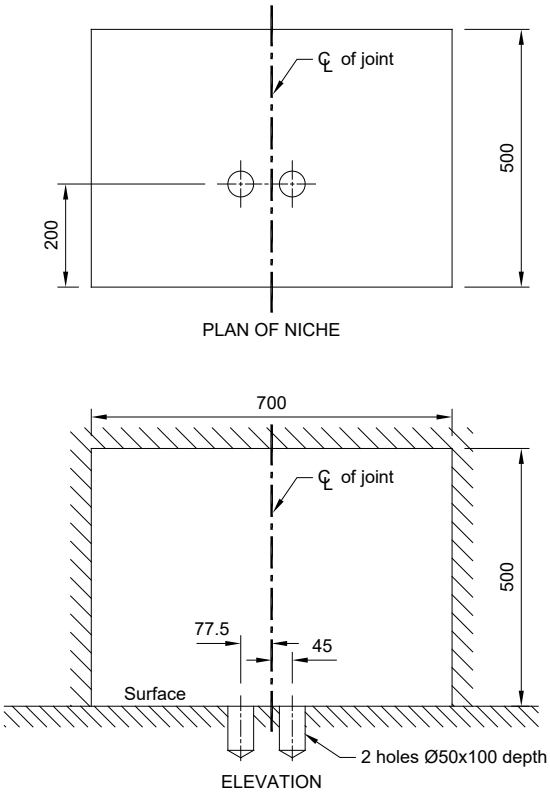


Figure 1

or overlooked, as otherwise the most reliable of instruments and data obtained from them will be rendered useless.

d To use their knowledge and common sense to find the solution to a particular problem on-site, depending upon field conditions.

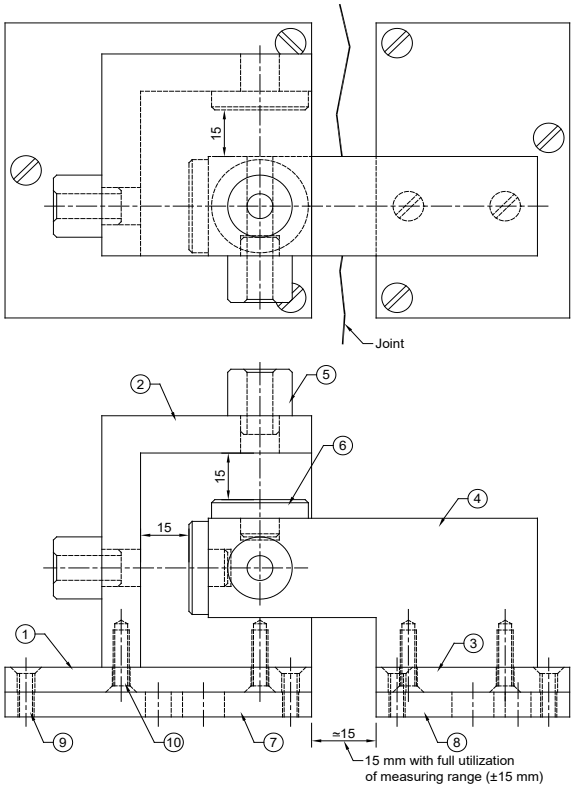
1.4 Tools required for installation

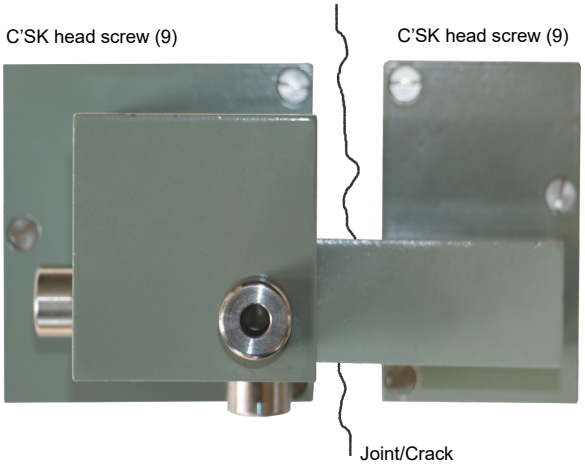
1. Screwdriver set
2. Grouting fixture
3. Loctite 290

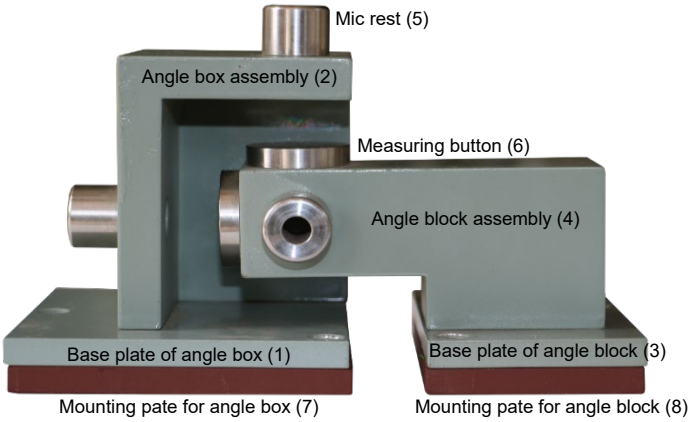
2 INSTALLATION PROCEDURE

2.1 Installation of ± 15 mm mechanical triaxial joint meter

A complete setup of the ± 15 mm range triaxial joint meter is shown in the picture with all the parts. Please refer to figure 1.







S. no.	Desctiption	Qty.
1	Base plate of angle box	1
2	Angle box assly.	1
3	Base plate of angle block	1
4	Angle block assly.	1
5	Mic rest	3
6	Measuring button	3
7	Mounting plate for angle box	1
8	Mounting plate for angle block	1
9	C'sk head screw, M5x12	6
10	C'sk head screw, M5x15	5

Figure 2 Details of EDJ-40TJ 15 mm range mechanical triaxial crack/joint meter

1. The grouting plate/template is supplied assembled with the triaxial crack/joint meter as shown in

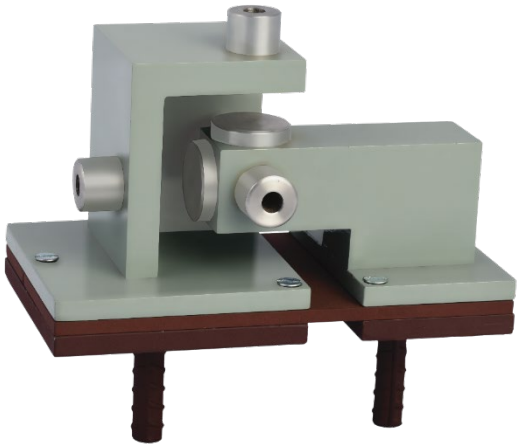


Figure 3

figure 2.

2. Unscrew the angle box assembly (2) from the mounting plate for angle box (7) & angle block assembly (4) from mounting plate for angle block (8) by unscrewing the C'SK head screw (9).

NOTE: Refer to figure 1 for item numbers within the brackets

3. Mark the location of pits on either side of the crack/joint to be monitored using the grouting template/plate supplied. The two smaller holes beside the bigger size grouting holes represent the center of the pits.
4. Place the grouting fixture above the crack or joint such that the crack is approximately along the long axis of the rectangular area between screws denoted as ABCD in figure 4. Mark the location of two pits and prepare each having diameter 50 mm and depth 100 mm as shown in figure 4.
5. Then fix the mounting plates (7) and (8) on the grouting template/fixture as shown in figure 4 and figure 5.
6. ZPlace the studs located at the bottom of the mounting plates in the center of the pits on either side of the crack/joint.
7. Fill grout in the pits through the grouting hole provided. Allow 48 hours to cure.
8. Remove grouting template and fix angle box assembly (2) & angle block assembly (4) on the respective plate with the help of screws. Use thread locker Loctite 290.

Mounting plate for angle box (7) **Mounting plate for angle block (8)**

Figure 4 Mounting plates

Figure 6 Grouting template

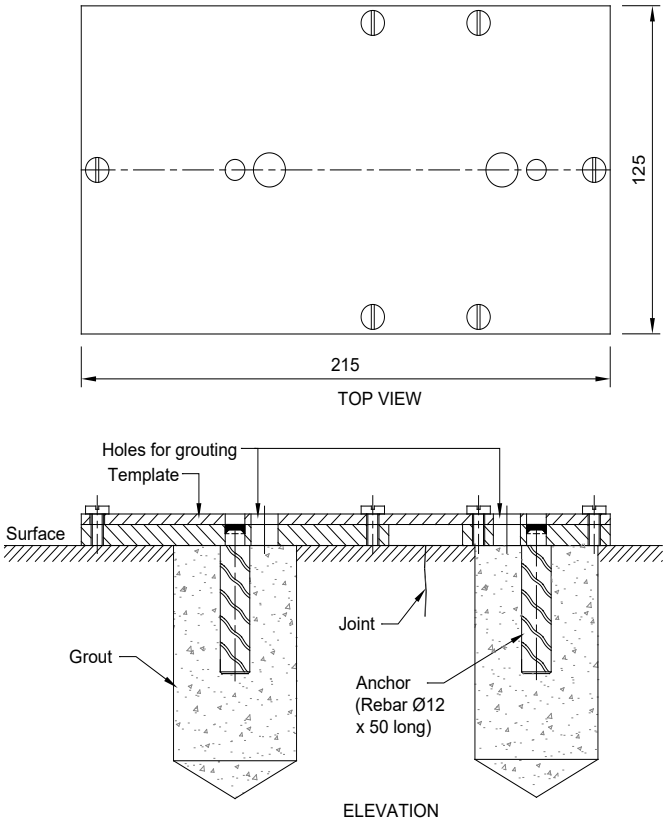


Figure 5 Details of pits for installing mounting plates

2.2 Installation of ± 25 mm mechanical triaxial joint meter

A complete setup of the ± 25 mm range triaxial joint meter is shown in the picture with all the parts. Please refer to figure 1.

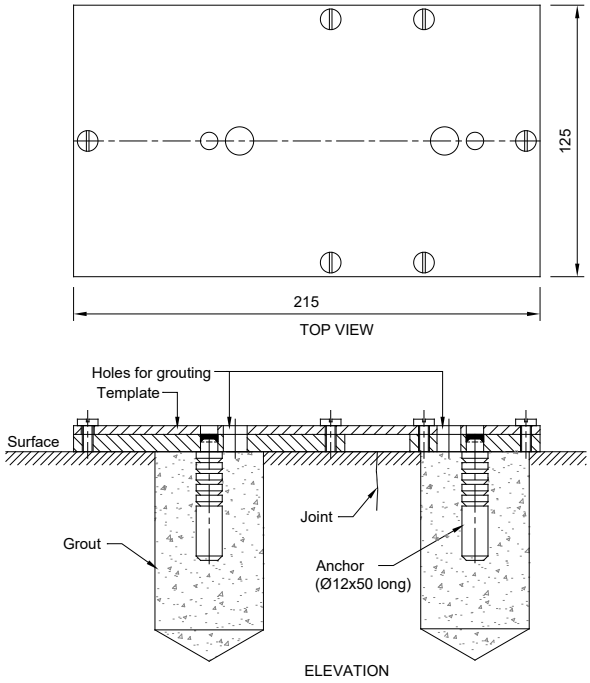
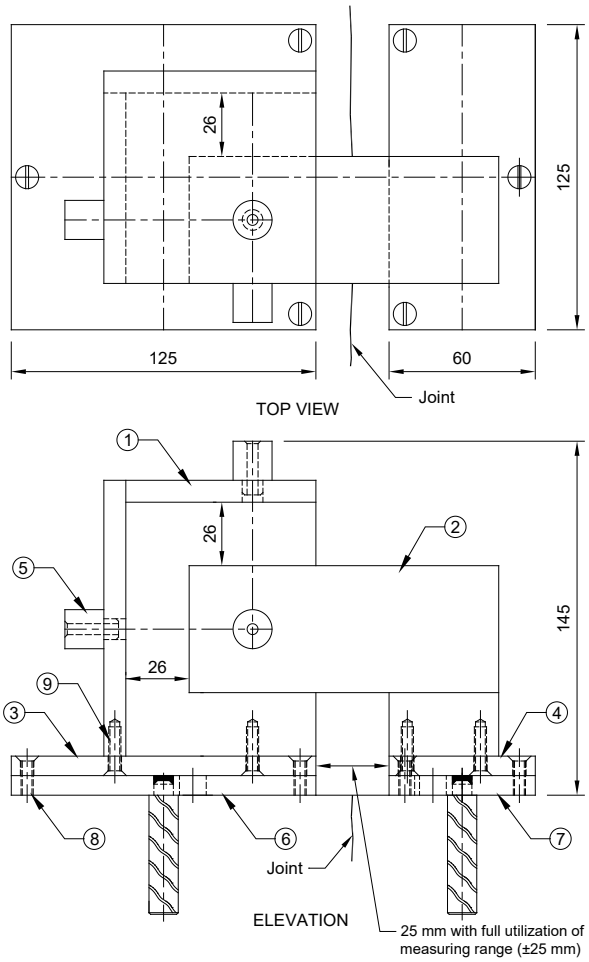


Figure 7



S No	Description	Qty
1	Angle box assly.	1
2	Angle block assly.	1
3	Base plate of angle box	1
4	Base plate of angle block	1
5	Mic rest	3
6	Mounting plate for angle box	1
7	Mounting plate for angle block	1
8	C'sk head screw, M5x12	6
9	C'sk head screw, M5x15	6

Figure 8

1. The grouting plate/template is supplied assembled with the ±25 mm range triaxial crack/joint meter (similar as shown in figure 2 for ±15 mm range).
2. During the installation process, grouting plate/template has to be removed and attached to the mounting plate for the angle box (item 6 in figure 7) and the mounting plate for the angle block (item 7 in figure 7) using separate pan-head screws supplied.
3. C'SK screws (item 8 in figure 7) have to be used again for installing the angle box assembly mounted on its base plate (item 1 & 3 respectively in figure 7) and angle block assembly mounted on its base plate (item 2 & 4 respectively in figure 7) to the respective mounting plates after removing the grouting plate.
4. The installation procedure is same as described in section 2.1 for ±15 mm range

3 TAKING READINGS

(Refer to figure 1 for item numbers within the brackets)

After the installation, measure depth of measuring button (6) for all X, Y & Z axes passing the depth gage (figure 6) through the mic rest (5) (figure 7; X, Y-axis readings are not shown in the figure, however, readings in these axes can be taken in the same manner as shown for the Z-axis).

Record these readings as initial readings.

Regularly take readings and observe the change in readings by comparing these with the initial readings.

Figure 9 Depth gage

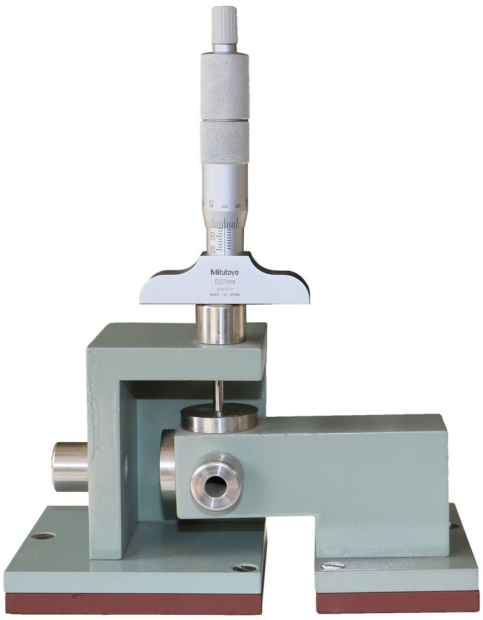


Figure 10 Taking readings using a depth gage in Z-axis

4 FREQUENCY OF READINGS

4.1 Recommended minimum frequency of observation of a mechanical triaxial crack/joint meter, during the construction, should be once a month.

4.2 The frequency of readings will be increased following any breach of threshold review level.

4.3 The frequency of readings following completion of construction activity may be reduced to once in three months & stopped if no further movement is evident for at least six months following activity completion.

NOTE: Base reading of all instruments must be established sufficiently before the commencement of any activity which is likely to influence the triaxial join meter readings, for example, impounding of the dam For establishing base reading of an instrument it is recommended take at least three sets of data. It is also recommended to note the ambient temperature while taking the joint meter readings and use the same depth gage for taking readings of the joint meter throughout the duration of the project.