



**RST INSTRUMENTS LTD.**

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# Convergence Meter Operating Manual

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# Convergence Meter Operating Manual

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Although all efforts have been made to ensure the accuracy and completeness of the information contained in this document, RST Instruments reserves the right to change the information at any time and assumes no liability for its accuracy.

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## Table of Contents

<b>1</b>	<b>GENERAL DESCRIPTION .....</b>	<b>1</b>
1.1	APPLICATIONS .....	1
1.2	FEATURES .....	1
1.3	SPECIFICATIONS .....	1
1.4	OPTIONS .....	1
<b>2</b>	<b>INSTALLATION .....</b>	<b>1</b>
<b>3</b>	<b>CONVERGENCE METER EXTENSION INSTALLATION.....</b>	<b>4</b>
<b>4</b>	<b>LINEAR DISPLACEMENT TRANSDUCERS .....</b>	<b>6</b>

## Table of Figures

Figure 1:	Convergence Meter .....	2
Figure 2:	Remove Upper Head Adapter .....	4
Figure 3:	Install Convergence Meter Extension .....	5

# 1 GENERAL DESCRIPTION

The RST convergence monitor is an economical, robust instrument for the continuous or random monitoring of ground closure in mining and civil engineering projects.

The convergence monitor consists of a sensor unit coupled to a lower, spring loaded leg and an upper, adjustable leg. The sensor itself consists of a digital indicator that displays movement in inches or millimeters.

Optionally, the convergence monitor can be modified to include the ability to be remotely read by a datalogger. This is especially useful in applications where continuous monitoring is essential.

The RST Convergence Meter is shipped fully assembled, ready for installation.

## 1.1 APPLICATIONS

- Mine development in squeezing ground
- Tunneling
- Remnant mining
- Roadway intersections
- Regional subsidence and closure surveys

## 1.2 FEATURES

- Digital indicator with standard range of 6" (150 mm)
- Adjustable upper leg with coarse height adjustment, 6" (150 mm) increments, and fine height adjustment, 1" (25 mm) increments

## 1.3 SPECIFICATIONS

- Standard monitoring range: 6" (150 mm), other ranges available upon request
- Resolution: 0.0005" (0.01 mm)
- Span: 146 in. (3.7 m) fully extended, 81" (2.06 m) retracted (custom sizes available upon request)

## 1.4 OPTIONS

- Optional Steel Conic Seats Part No. **EXCN0100**
- Optional Convergence Meter Extension **EXCN0200** Span: 200 in. (5.0 m) fully extended, 81" (2.06 m) retracted
- Custom sizes available upon request
- Can be outfitted with various Linear Displacement Transducers

# 2 INSTALLATION

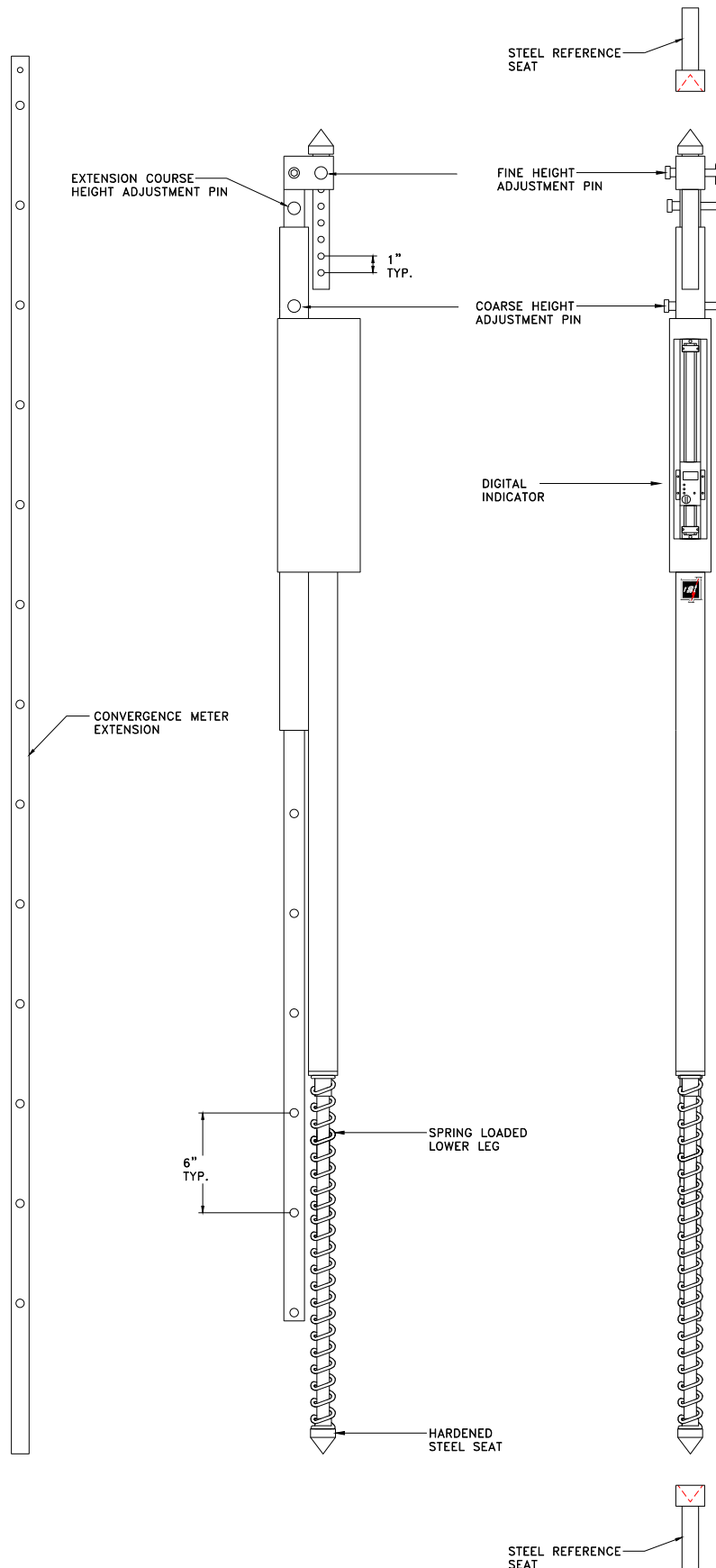
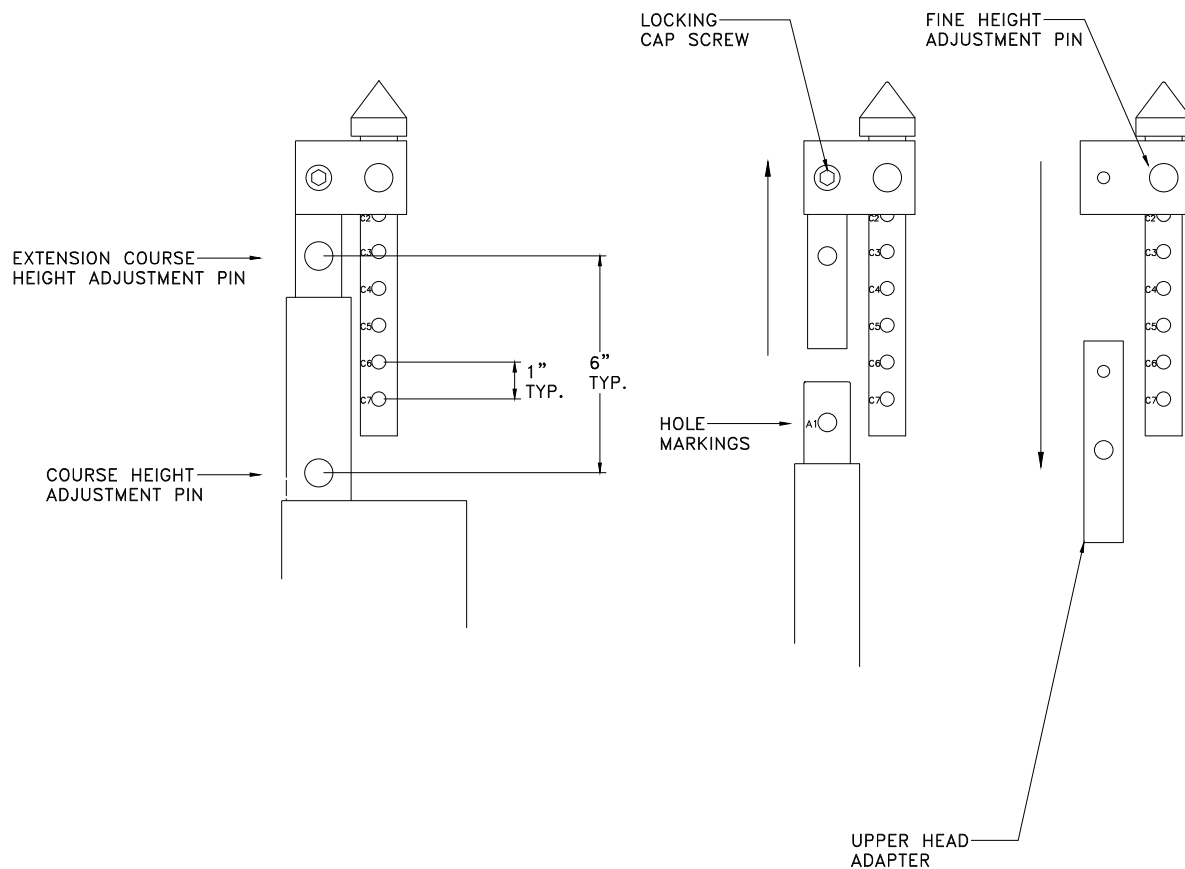


Figure 1: Convergence Meter

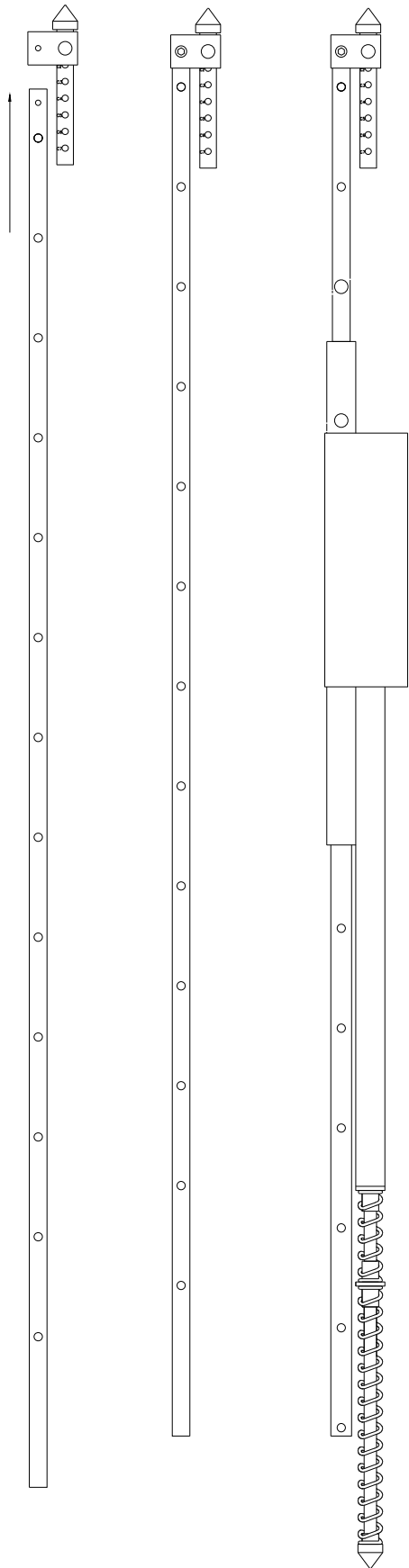
1. Install the steel reference seats at the upper and lower zone (i.e. back and floor) to be monitored. The seats should be installed inline so that the convergence meter when installed will be vertical.
2. Measure the distance between the reference seats.
3. Adjust the coarse adjustment leg, and, if necessary, the fine adjustment leg so that the Convergence Meter span is slightly greater than the distance between the reference seats.
4. Position the Convergence Meter so that it is almost upright and place the lower leg of the Convergence Meter into the reference seat, in the floor.
5. Pull down on the Convergence Meter to compress the springs.
6. Place the top of the Convergence Meter into the upper reference seat in the back of the tunnel.
7. Once the unit is in position, collapse fully and turn on the digital indicator by inserting a blunt tool through the hole in the clear faceplate and pushing the ON/ZERO button. Select the units of measure while the unit is collapsed, the default is inches.
8. Ensure that the Convergence Meter is in slight compression (the reading on the Digital Indicator should be between 5-6 inches or 127-152mm). If the unit is not under compression then adjust the fine or course adjustment legs until the unit is under slight compression.
9. Record the reference numbers of the holes on the adjustment legs that all pins are located in. For the "A" series holes, the actual hole the pin is inserted into is hidden by the housing thus, read the next hole (above the housing) and add 1 (i.e. if the visible hole is A6, then the pinned hole would be A7).
10. Record the displayed height. Movements will be identified by changes in this baseline reading.

### 3 CONVERGENCE METER EXTENSION INSTALLATION



**Figure 2: Remove Upper Head Adapter**

1. Remove Course Height Adjustment Pin and Extension Course Height Adjustment Pin.
2. Remove Upper Head.
3. Remove the Locking Cap Screw on the upper head.
4. Replace Upper Head Adapter with Convergence Meter Extension
5. Bolt in place with Locking Cap Screw
6. Insert Extension/Upper Head into Convergence Meter and adjust Course and Fine Height Adjustment Pins to span the desired monitoring location.
7. Refer to Section 2 for Convergence Meter Installation.



**Figure 3: Install Convergence Meter Extension**



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## **4 LINEAR DISPLACEMENT TRANSDUCERS**

RST Convergence Meters can be equipped with a Linear Displacement Transducer as an alternative to the Digital Scale. The Convergence Meter operates in the same manner for spanning an opening, however a readout/Datalogger is used to take readings, as opposed to looking at the display of the Digital Scale. Refer to the Calibration Certificate, provided with each Convergence Meter, to convert readings into linear units.