

# USER MANUAL

## CONSOIL hydrostatic profiler C-2, -3 and -4

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## 1. INTRODUCTION

The CONSOIL PROFILER is designed primarily for measuring vertical movements or profiling areas not normally accessible to conventional survey techniques, i.e., the settlement of buried pipes, or to measure alignment in directional drilling or jacking of pipes.

The system consists of a pressure transmitter encased in a stainless steel probe, a tube assembly consisting of a liquid-filled tube with internal signal cable. The liquid-filled tube terminates in a clear plastic sight glass with an etch mark where the liquid reference level is maintained. The tube is contained in a cassette reel, and a readout or data acquisition unit is located in the hub of the cassette reel. The cassette reel is mounted horizontally on a surveyor's tripod.

In use, the probe and liquid-filled tube are paid off the cassette reel and the probe is positioned at various distances from the end of an underground pipe where measurements are required. Readings are taken which correspond to the difference in elevation between the probe's elevation and the reference elevation on the cassette reel. Either manually, or on a computer, the readings are then plotted to profiles.

## 2. SPECIFICATIONS

<b>Tube assembly lengths:</b>	50 m	100 m	150 m	(164, 328, or 492 ft)
<b>Tube assembly weights:</b>	20 kg	25 kg	34 kg	(44, 55 or 75 lb)
<b>Level range:</b>	Standard: 10 m (33 ft) - other ranges available			
<b>Read out:</b>	LCD 4+1 digits with 0.001 m (0.01 ft) resolution			
<b>Accuracy:</b>	In normal use better than 5 mm (0.15 ft)			
<b>Operating temp:</b>	-20 to +70 °C (-4 to +158°F)			
<b>Supply voltage:</b>	9-30 VDC with alkaline battery cells			

For the Data Acquisition System please refer to separate manual.



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### 3. TAKING MEASUREMENTS

#### A. PRECAUTIONS

1. Do not position pressure transmitter more than 10 m (33 ft) below reel to avoid overstressing.
2. Do not subject the probe to pressure shock waves through rough handling.
3. Do not bend the tubing more sharply than a radius of 150 mm (6 inch). Note: When feeding or pulling the tube assembly down a vertical manhole into a horizontal pipe we recommend fixing a roller, or similar, in position to protect tube assembly from damage and excessive bending.

#### B. SETTING UP THE REEL

1. Set the cassette reel up as close to the measuring pipe as possible.
2. Make sure that the cassette reel tripod is placed in a stable and level position on firm ground.
3. Open the screw on top of the clear acrylic sight glass to allow atmospheric pressure to enter the system.

#### C. CALIBRATION CHECK

1. Let the equipment come to equilibrium in the ambient temperature.
2. Switch on the readout box / Metrolog.
3. Insert the probe in the upper holes on the calibration tube assembly and record the reading after it stabilizes.
4. Move the probe down and insert in the lower holes. Record the stabilized reading there.
5. The holes are 500 mm apart; hence you should measure a difference of 500 mm. If the check is successful, proceed with the measurements as described in Section D. If not, see the heading D. CALIBRATION under Section 4. TROUBLESHOOTING AND MAINTENANCE.

#### D. TAKING MEASUREMENTS

1. Set up and level the cassette reel on the tripod near the entrance to the pipe to be profiled and determine the elevation of the etch mark on the sight glass if needed by conventional surveying techniques to a nearby benchmark.
2. Insert the probe through the pipe to be measured past the last measurement station.
3. Reel the liquid-filled tube back into the cassette reel and stop the probe at your chosen intervals to record the reading. Allow a few seconds after stopping to get a stable reading.
4. Keep a minimum amount of the liquid-filled tube exposed (i.e., to wind ) to minimize vibrations or movements that can increase error.
5. Check and adjust the liquid level in the sight glass now and then. Turn the adjusting valve in the hub of the cassette reel to raise or lower the liquid level to the reference level. The liquid level can vary depending on temperature and the amount of coiled and uncoiled tube. Maintain keep the same level during the entire profiling sequence.

## 4. TROUBLESHOOTING AND MAINTENANCE

The reel cassette assembly, the cable, the tube assembly, the pressure transmitter and the readout box are accessible for repair or replacement. Possible malfunctions and remedies are described in the following sections.

### A. LONG WAIT FOR A STABLE READING

1. Check for air bubbles in the inner liquid-filled tube. A bright light to backlight the tube is helpful. If bubbles are present, move them towards the sight glass. You can stretch out the tube on a slope or raise a section of the tube a few meters (ft) at a time to move the bubble along. To eliminate the bubbles you will have to lift and tilt the cassette reel. NOTE: A few bubbles less than about 10 mm (½ inch) long in a horizontal tube have no influence on the accuracy of the profiler.
2. Check to see that no part of the tube is vibrating (i.e., due to wind). This causes variable pressure waves in the liquid column and increases the error of the measurements. When measuring a pipe, such as a sewer pipe with rapid flow some motion may be unavoidable and hence increase error. With practice this is usually not a problem and sufficient accuracy can be obtained.

### B. NO TRANSMITTER SIGNAL

1. Check the readout box and battery condition. Two red diodes indicate low voltage. There are three 9V cells--a pair for the probe and one for the display. Alkaline batteries last for several months under average work conditions.
2. Check the pressure transmitter (PT) and leads. The PT is a sealed unit and not serviceable; however, it may be removed from the probe and replaced. Unthread the probe housing carefully at the tube end to access the PT. Check continuity of the conductors between the PT and the readout box. You should measure about 10 Ω. If an open circuit is indicated, a break in the conductors is the probable cause. If the resistance checks out return the PT or the readout unit for service.

### C. OTHER MAINTENANCE

1. Always keep the liquid system filled. The antifreeze is 1 part ethylene glycol to 2 parts distilled deaired water by volume. If freezing will not occur use only distilled and deaired water. DO NOT USE TAP WATER.
2. Remove the batteries if the profiler is to be stored for more than a month between uses.
3. When not in use keep the probe at the level of the reel to minimize stress on the PT. Do not bend or twist the connection between the probe and the tubing unnecessarily.
4. Service about every 2 years under normal use.

### D. CALIBRATION

1. Make a check before going out in the field check the ref level between the upper and lover hole on the tripod the differens should be 500mm +/-1mm. If you get a bigger differens contact your CONSOIL salesagent for further info.

REMEMBER to keep the reference level of the liquid in the sight glass at the index line.

THE PROFILER HAS BEEN MANUFACTURED IN THIS VERSION SINCE 1984 AND HAS PROVED TO BE MOST DURABLE AND RELIABLE. ALL COMPONENTS ARE MADE OF NONCORROSIVE MATERIALS AND DESIGNED FOR ROUGH HANDLING IN ACTUAL FIELD WORK. NEVERTHELESS THE PROFILER IS A PRECISION INSTRUMENT, AND IF MAINTAINED AND TRANSPORTED CAREFULLY, WILL PROVIDE LONG TERM SERVICE.



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