Prover Leak Detector Kit FMD-007
Installation and Operating Manual

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Introduction

The Prover Leak Detector Kit manufactured by Flow Management Devices, LLC (Flow MD) ™ is a maintenance tool to assist in identifying damage/wear to internal sealing components. Use of this device should be performed by only trained and qualified personnel. This manual will cover the installation and operation of the leak detector kit in detail. This leak detection system is intended to give a general idea of the condition of the piston seals. It does not guarantee prover performance.

Safety Notes-

- Lock out/tag out any energy source by qualified personnel.
  - Energy source – Any source of electrical, mechanical, pneumatic, chemical, thermal or other energy.
- Liquids that are compressed gases e.g. propane, ethane etc, can flash off if system is vented or PSV device opens. Prover drive system and leak detector can suddenly move with great force.

Theory of Operation

The leak detector works by measuring the piston displacement and time. The provers piston is pushed downstream effectively generating a pressure differential. Movement of the piston is an indication that liquid has moved from the downstream to upstream end of the prover. Measuring the displacement of the piston and the time it occurs establishes a leak rate. Note: It is assumed that all movement of the piston is a result of leak by the piston inside prover. Leaks elsewhere in the system will falsely indicate a piston seal leak. Temperature must be stable to ensure movement is not due to thermal expansion/contraction.

The basis of the allowable leak rate is determined by considering a leak that is very small (i.e. near the uncertainty of the prover volume) that would occur at a very low flow rate (i.e. turn down ratio > 50). During normal proving operations a leak of this size would be unmeasurable as it is a small fraction of the measurement uncertainty.

Tools Required

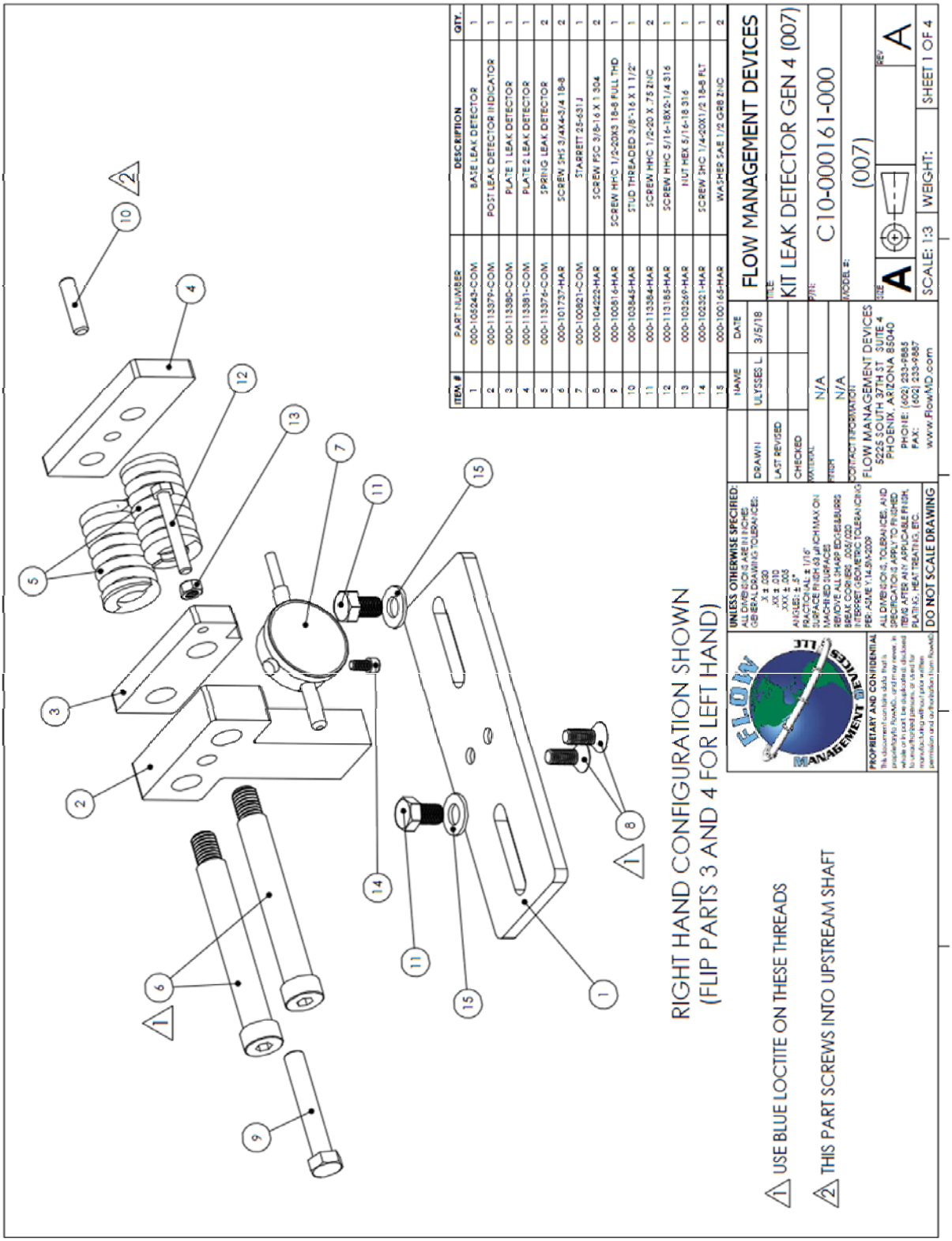
1) Leak Detector Kit

2) Wrench or ratchet

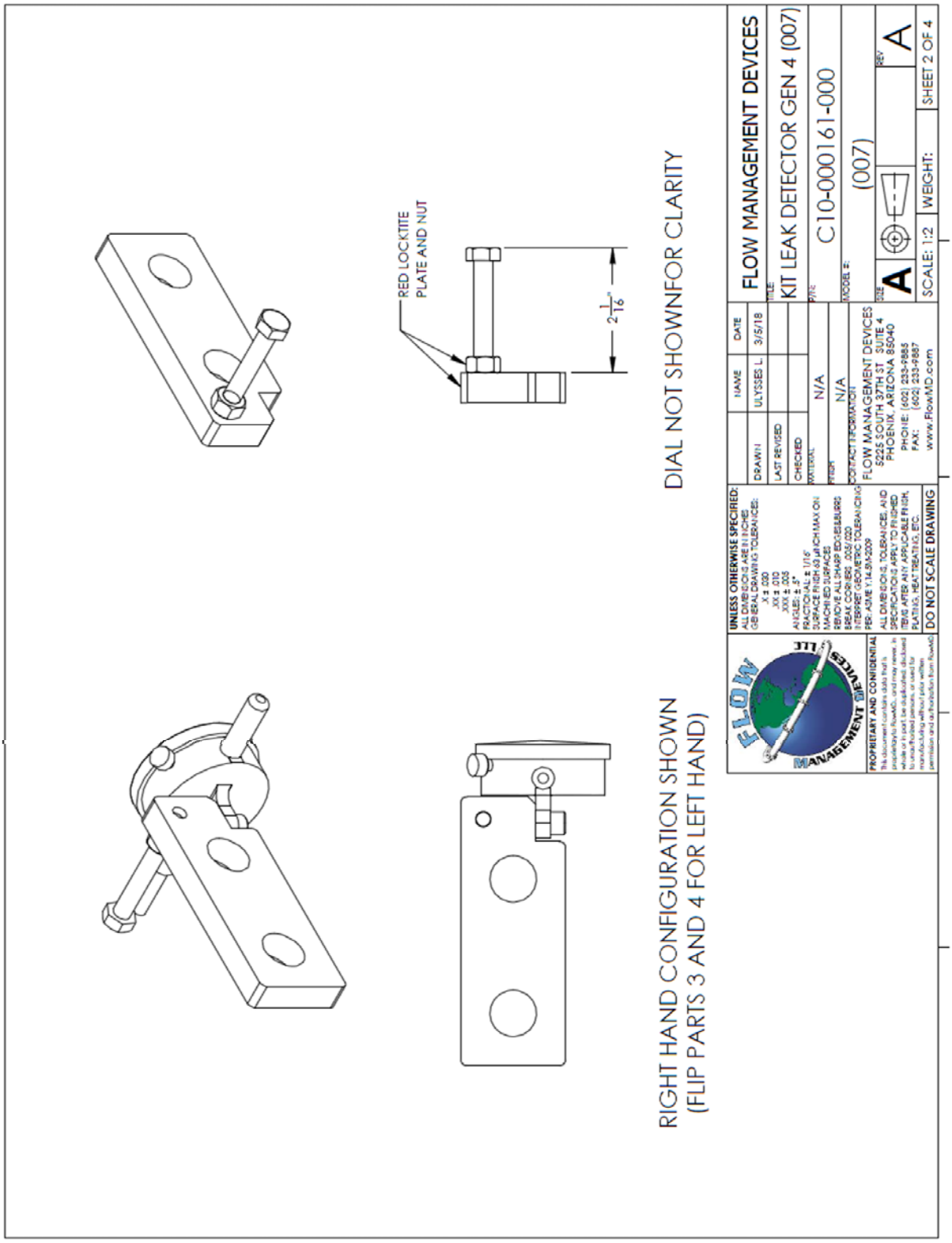
3) Means to measure elapsed time. Clock, watch, phone or stopwatch.

Leak Detector Kit Main Components

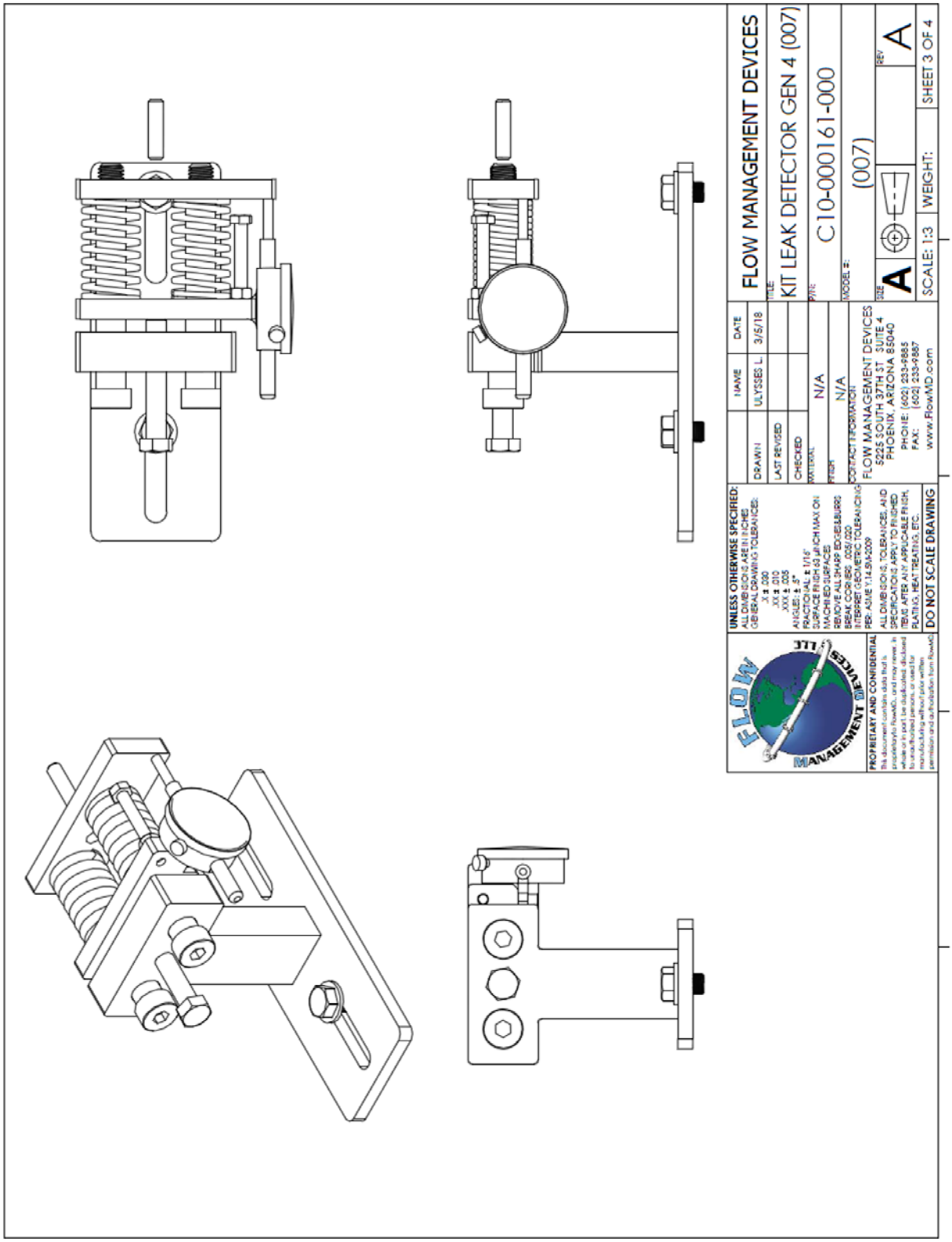
Verify all components in the kit



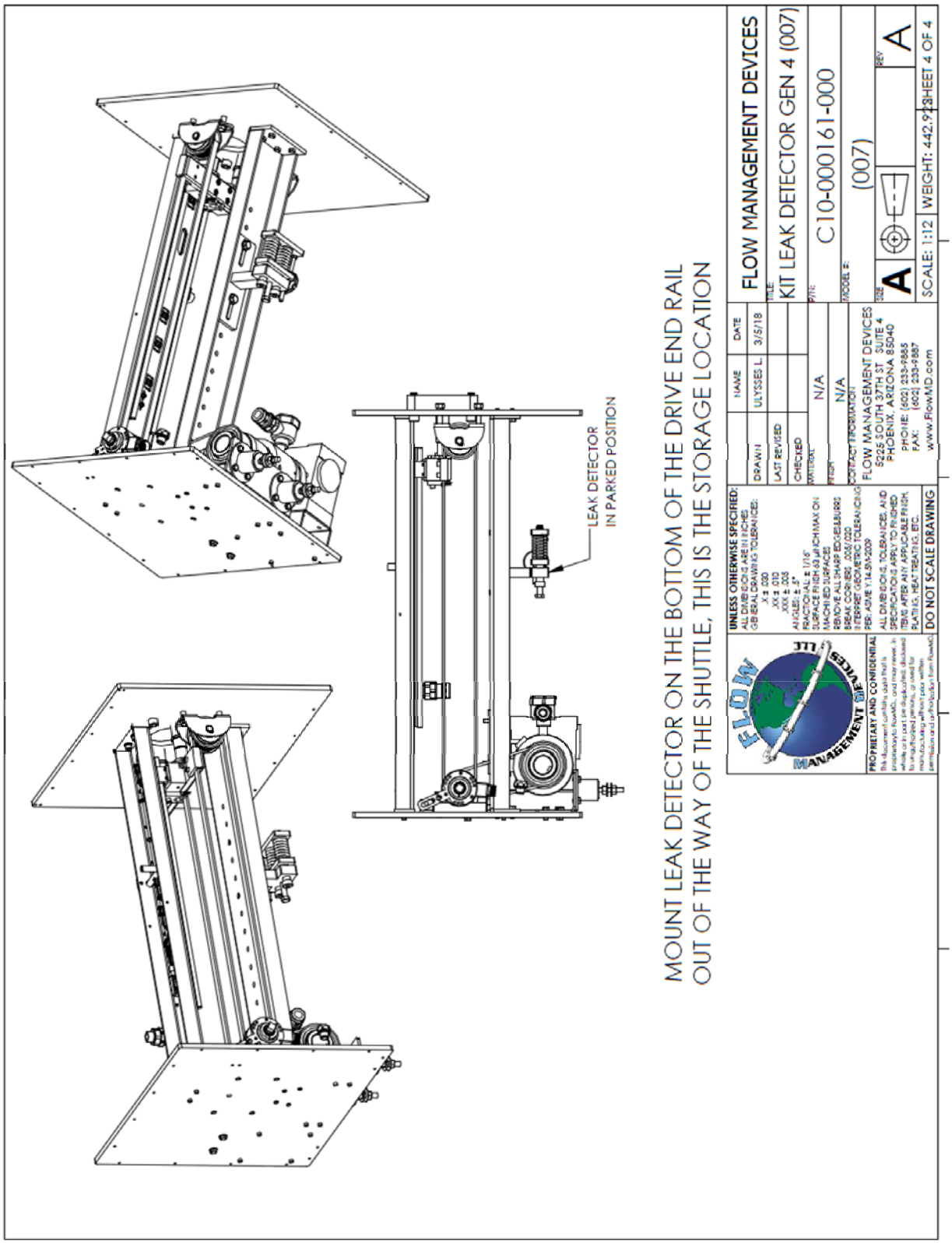
Leak Detector Item 3 detail

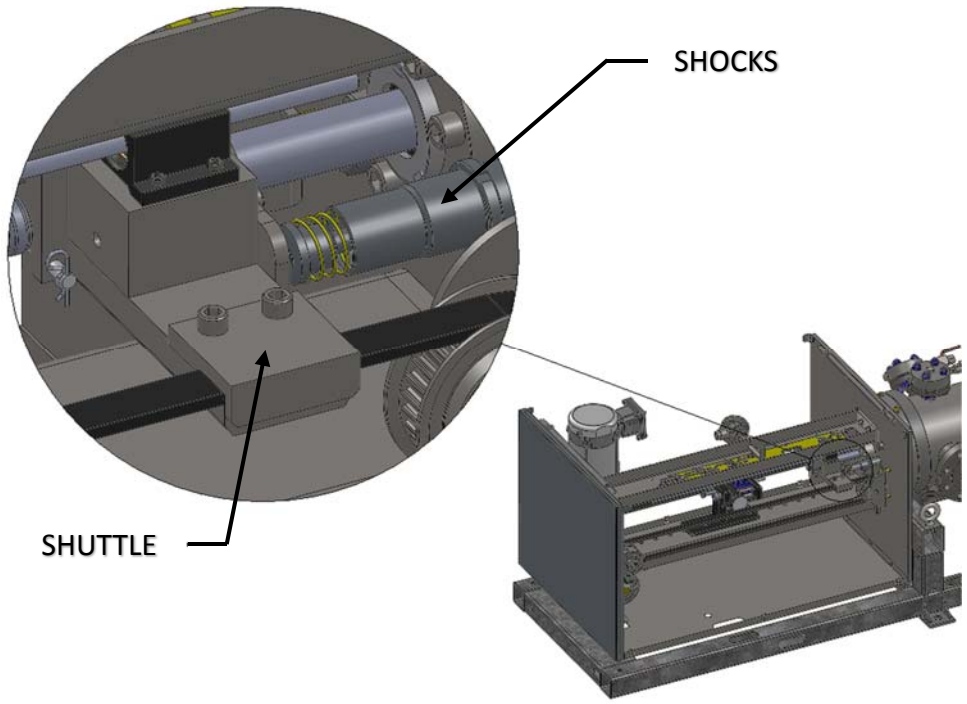


Leak Detector Assembled (Right Hand Configuration)



Leak Detector Kit (Storage Position)





STEP 1:

If possible start with the piston downstream (i.e. shuttle at the shocks), this will allow you to pull the piston upstream to the desired test position.

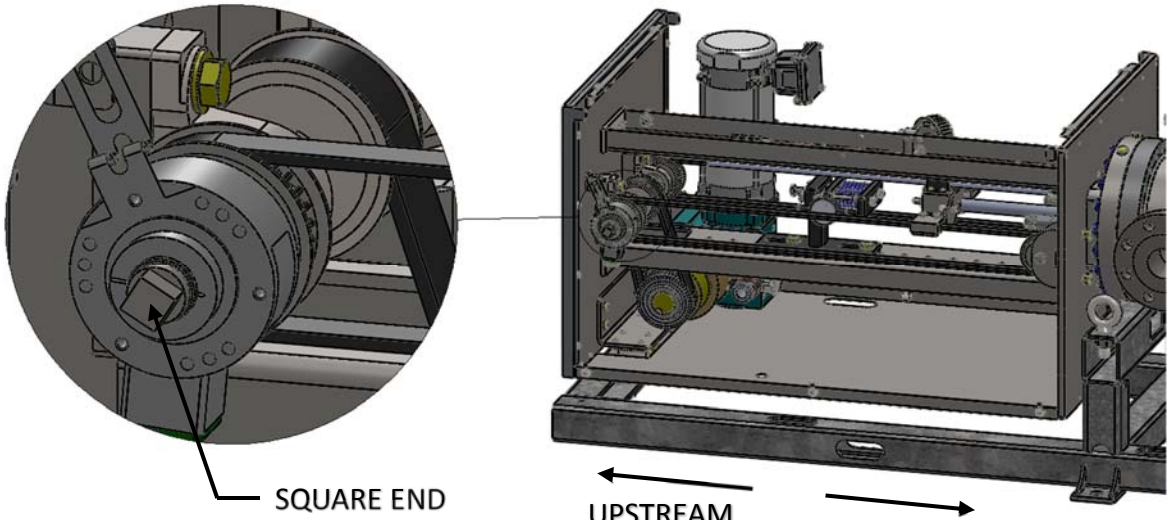
STEP 2:

Disconnect all power to the prover then perform Lock out / tag out procedure to prevent accidental startup of the prover during testing.

Step 3:

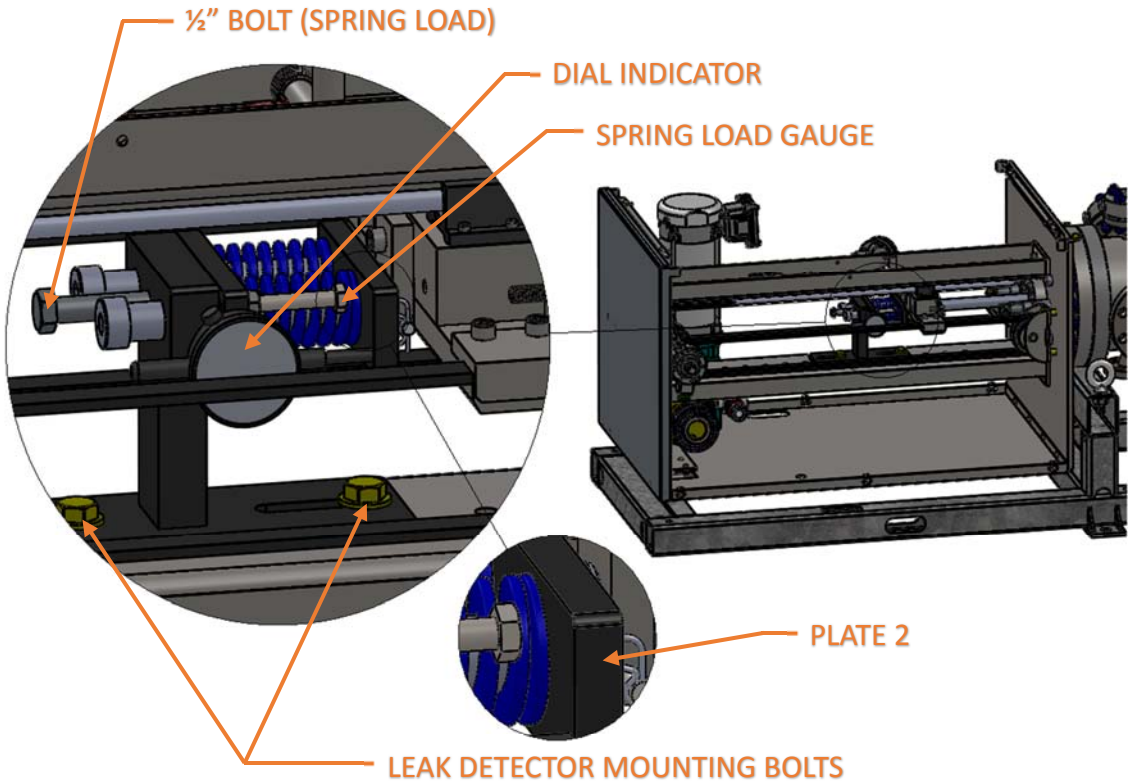
Close all valves and process connections leading into or out of the prover. If there is any leak by these valves, depending on the rate may cause the test to fail which means we cannot determine if there is any leak past the piston or if the leak past the piston is acceptable.

SAFETY PROCEDURE REMINDER:
LOCK OUT / TAG OUT ELECTRICAL SUPPLY
AND ALL INLET / OUTLET PROCESS CONNECTIONS



Step 4:

With your wrench on the square end of the shaft move the piston slightly upstream of the desired test position, then move the piston downstream creating a slight pressure differential across the piston. This will help take up any slack in the leak detector.



Step 5:

Mount the leak detector to the top of the C channel (test position) right up against the upstream piston shaft and tighten leak detector to C channel. Tighten the spring load bolt until the spring load gauge just touches plate 2 and zero the dial indicator, the leak detector is now in test mode start timing the test.

Note: Do not tighten spring load bolt anymore once the spring load gauge has made contact with plate 2 or damage to the leak detector/prover may result

Test duration is 10 minutes, at the end of 10 minutes if the dial indicator reads movement equal to or less than .025" this is a pass if movement is over .025" test is a fail and piston maintenance is recommended.

If there are no leaks into or out of the system, the only leak path is past the piston. If there is a leak occurring past the piston the springs will slowly expand, and the piston will travel downstream.

Note: Verify there are no leak paths in or out of the system as this will give a false result

Step 6:

Remove leak detector from top of C channel (test position) and re-attached below C channel in the storage position as shown on page 7.

Note: Never operate prover with the leak detector in the test position damage to the leak detector and prover will result