

Minn Kota 101 Without Pressure Compensation

Presented by

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Block Island, RI**



Redus Engineering

DELIVERING KNOWLEDGE. DEVELOPING COMPETENCE.

Topics

- ✓ Why?
- ✓ Test Setup
- ✓ Seal Adapter
- ✓ Case Studies
- ✓ Conclusions
- ✓ Future Work





Why?

- ✓ **Reliability of Pressure Compensated MK-101's**
 - ✓ Issues with Air Compensation
 - ✓ Issues with Oil Compensation

Topics

✓ Why?

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✓ Future Work

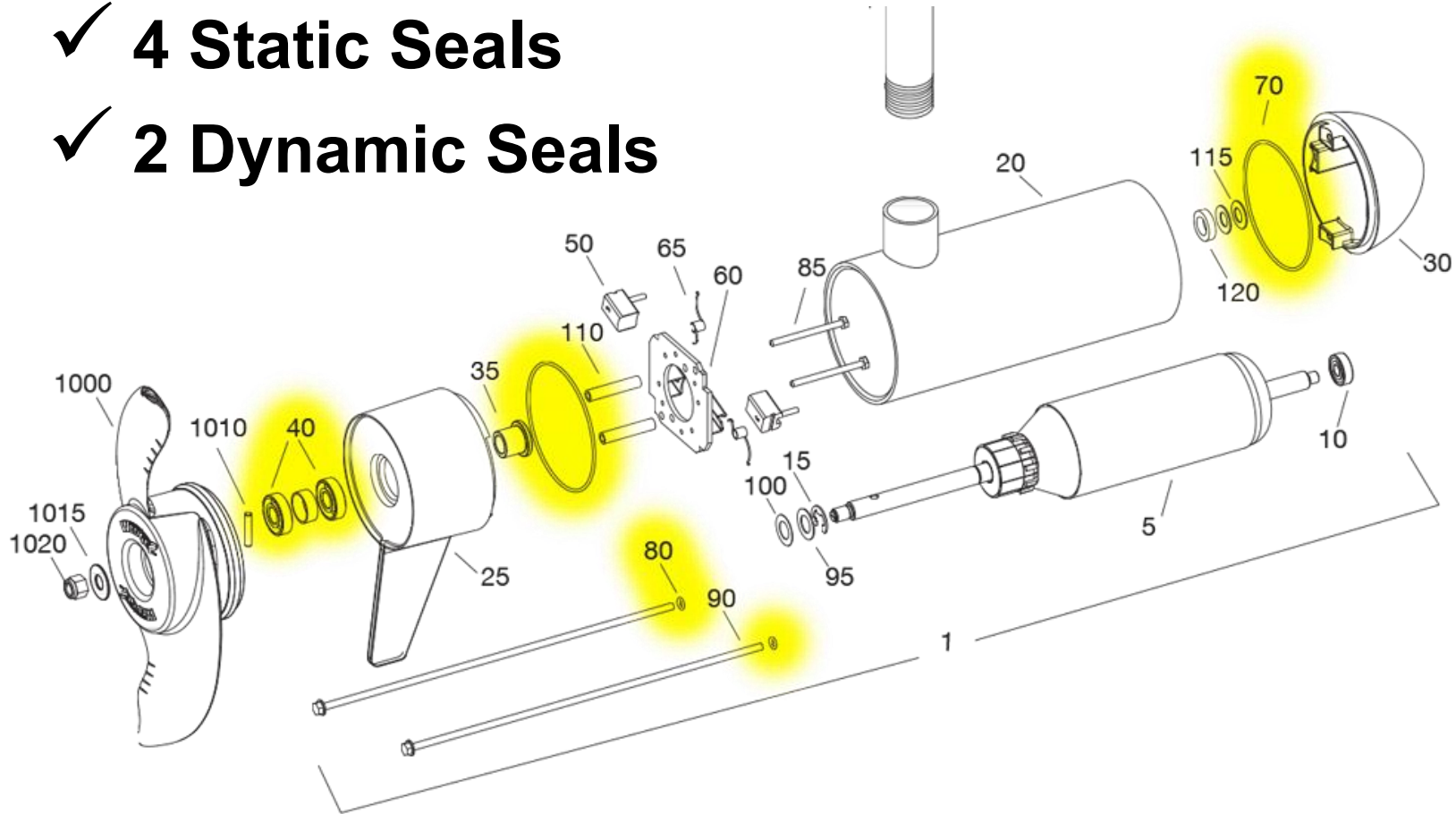


Minn Kota 101 Lower Unit (4")



Lower Unit Seals

- ✓ 4 Static Seals
- ✓ 2 Dynamic Seals



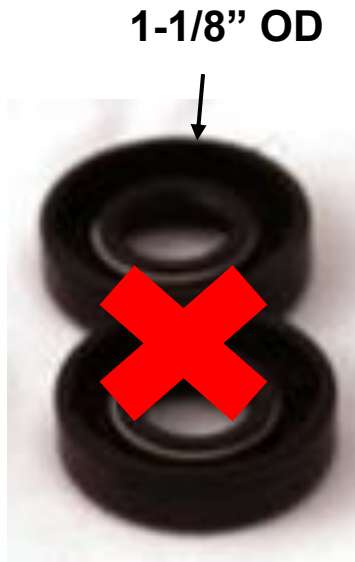


MK 101 Lower Unit Seals

2889460 Seal and O-Ring Kit for 4" Diameter Lower Units

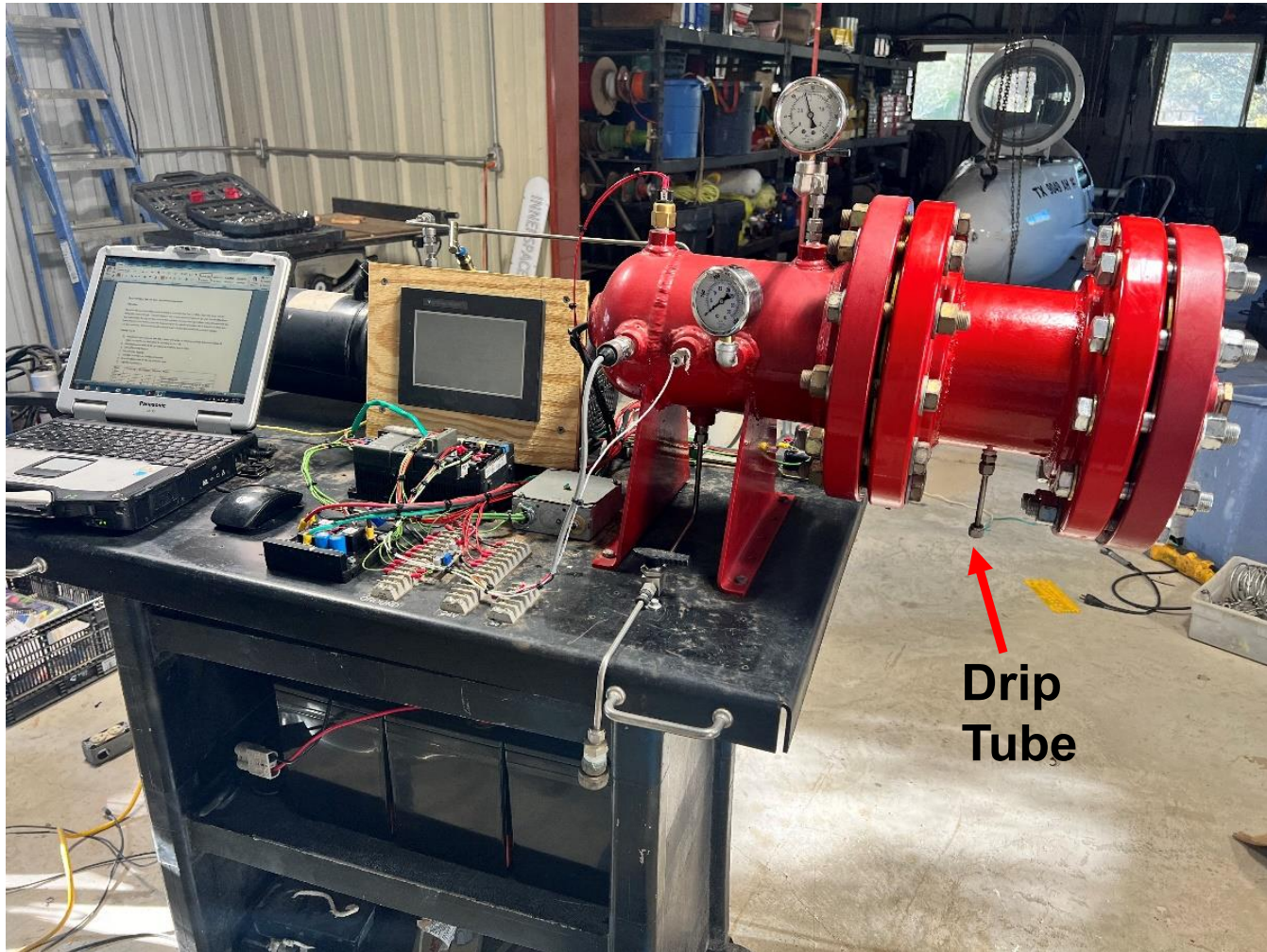


Parker FlexiSeal Rotary Seal part no. 0301-FC-S-187-00500-260-S-C-M

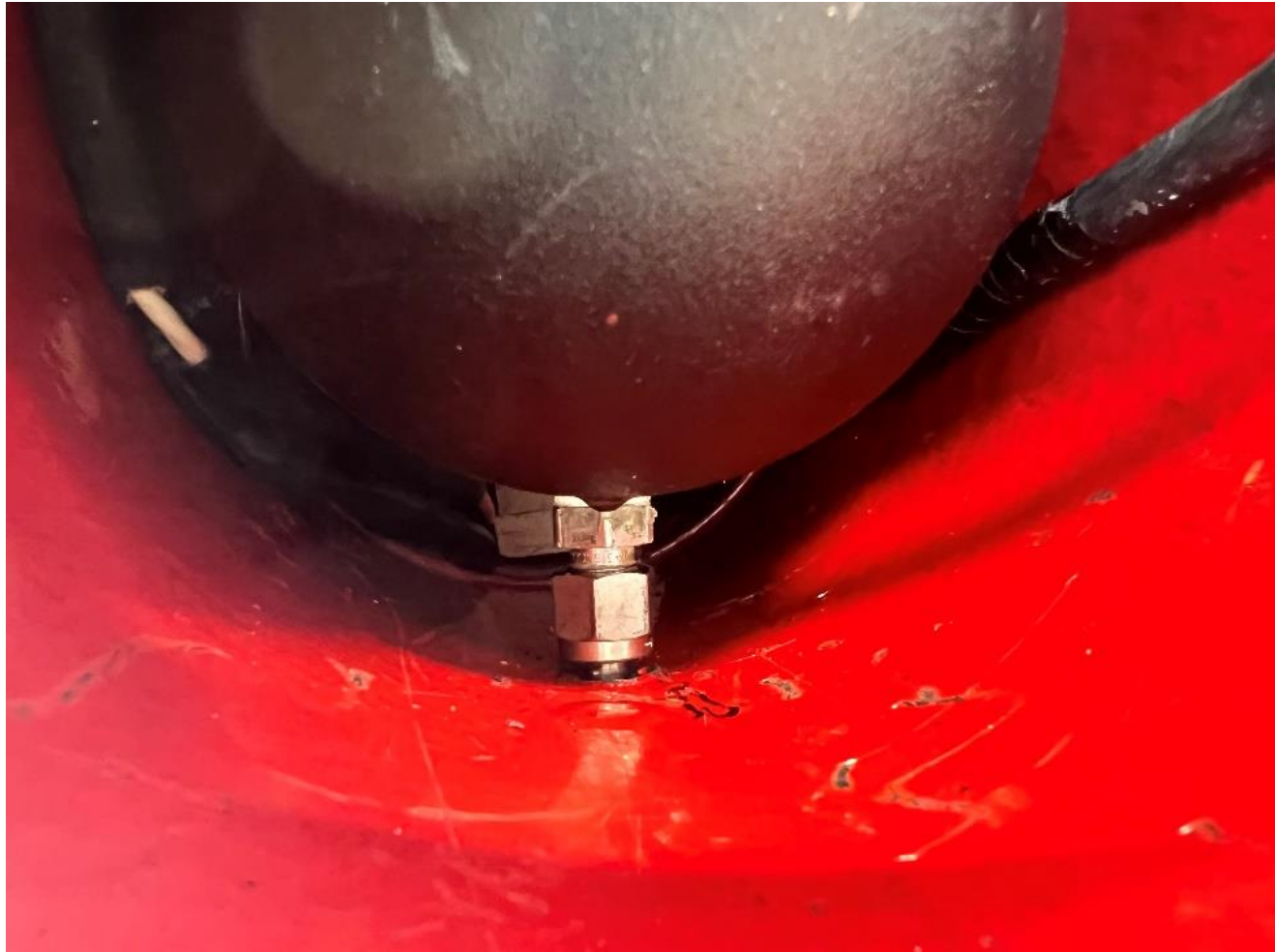




Test Cell with drip tube



MK-101 and Drip Tube



Mod. - Drip Tube Port



**Swagelok 1/4 NPT
to 1/4 tube fitting**

**92-200-160 Minn
Kota 4" Center
Housing**



HMI Screen



Minn Kota 24/36V Motor Controller, 2774037



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Lower Unit Seal Adapter



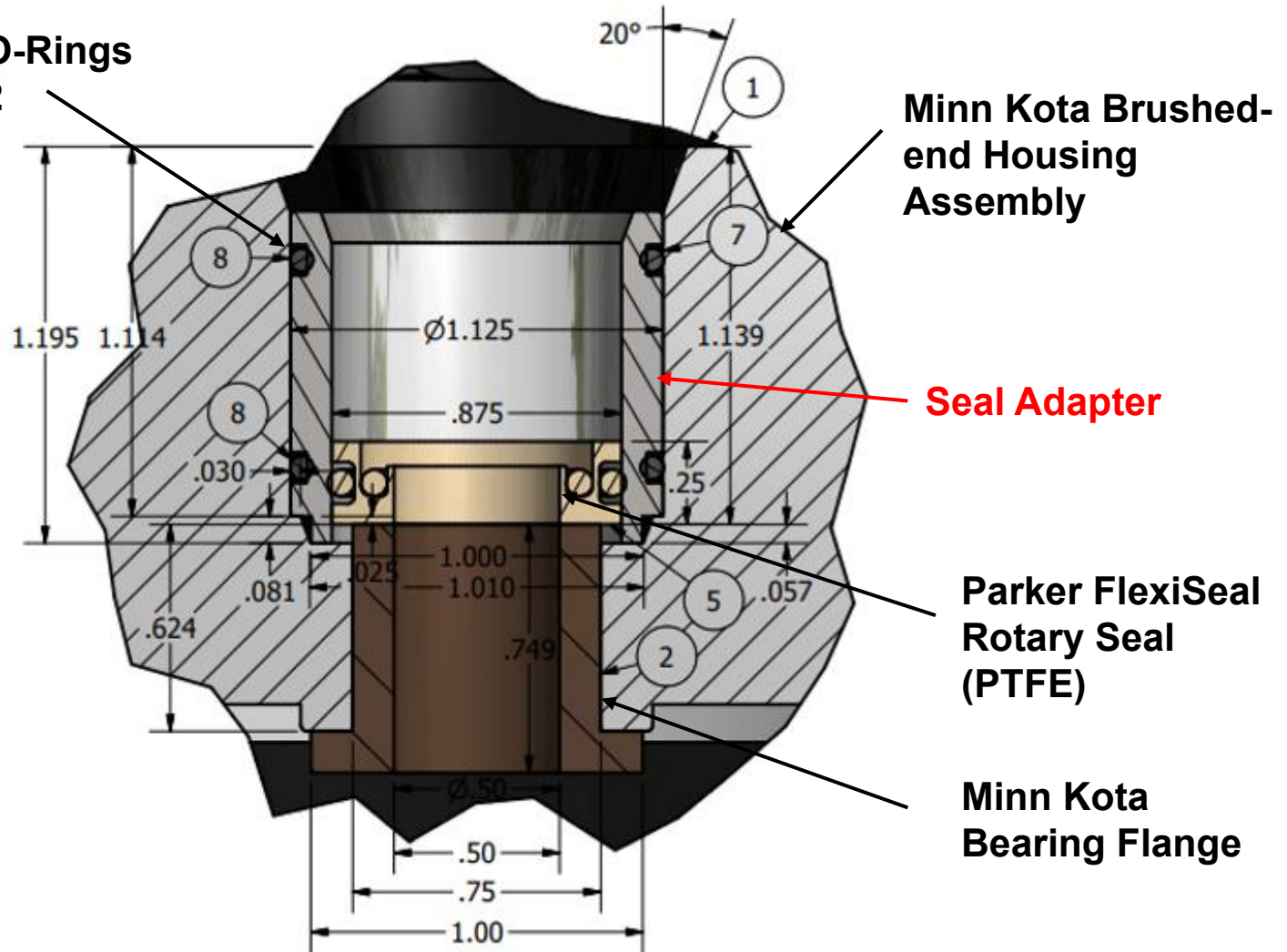
- ✓ Original Bore 1.125"
- ✓ Adapter Bore 0.875"

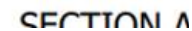


Seal Adapter



Buna-N O-Rings
Dash 022





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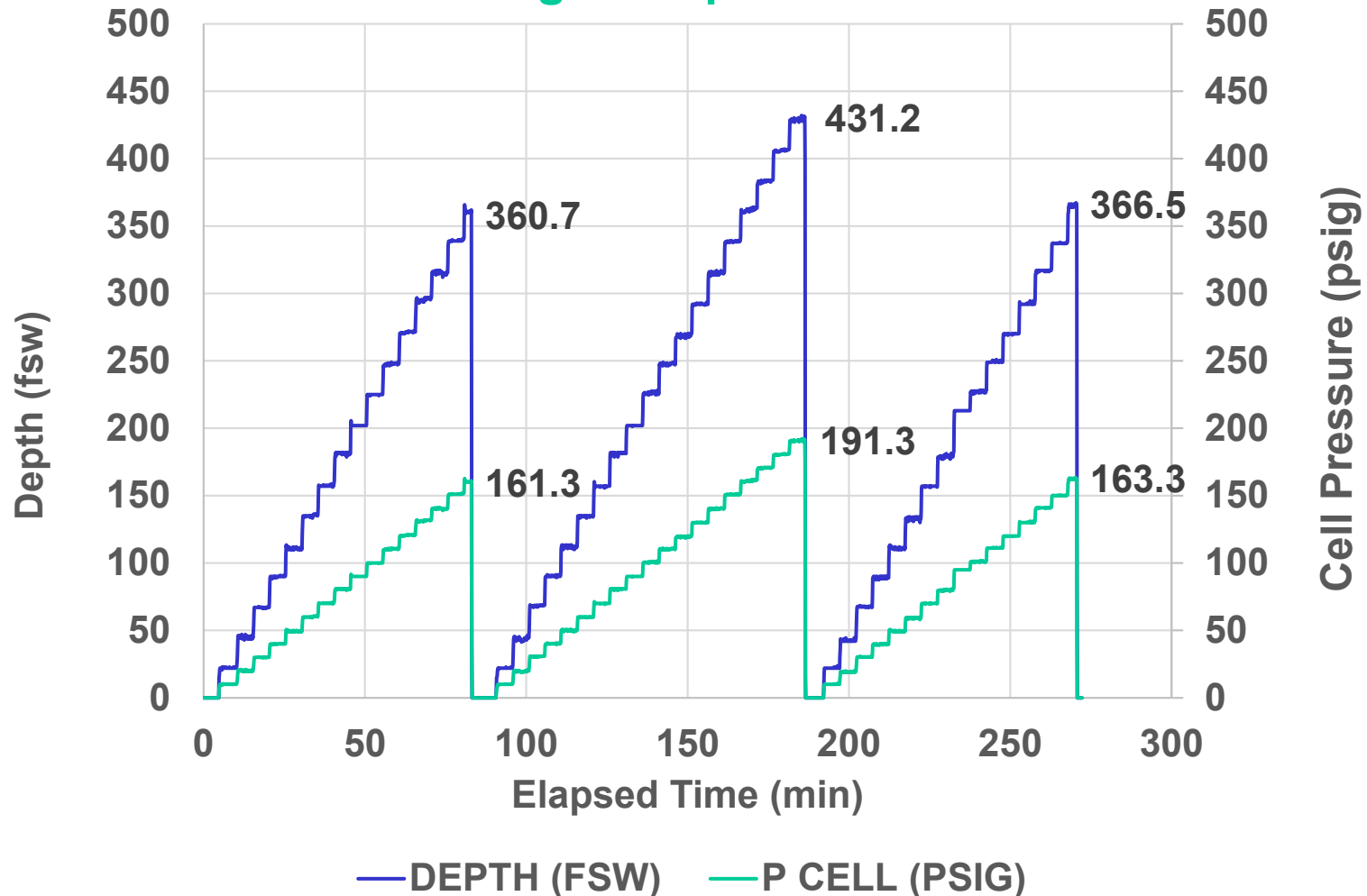
Case Studies

Test Cases	
No.	Case Description
1	Original Lip Seals, Leakage Onset Depth & Flowrate
2	Original Lip seals, Leakage Onset Depth
3	Parker FlexiSeal Rotary Seal, Break-In
4	Parker FlexiSeal Rotary Seal, Leakage Depth
5	Repeat Original Lip Seals , Leakage Onset Depth



Case 2 - Depth

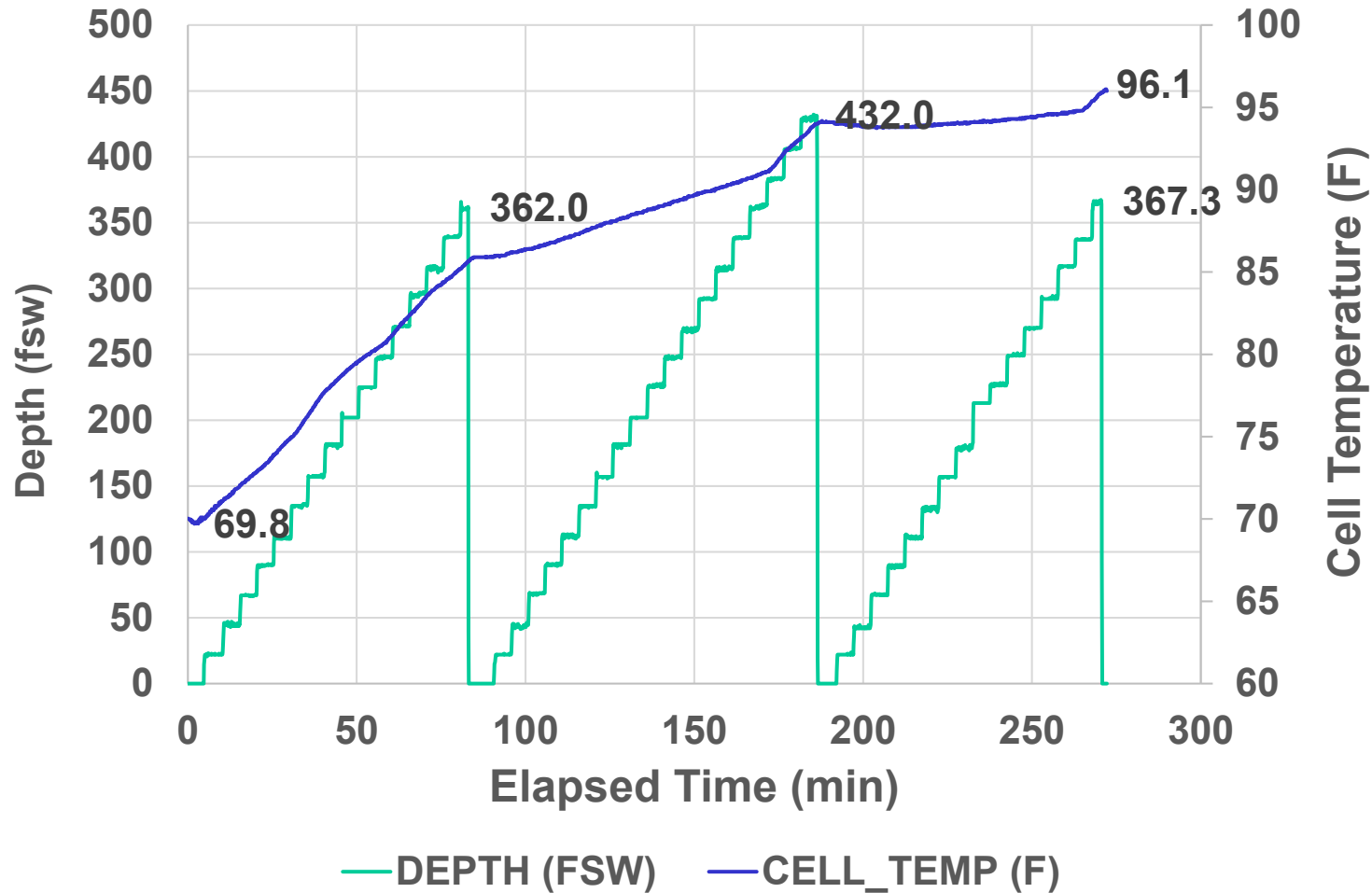
Original Lip Seals





Case 2 - Temperature

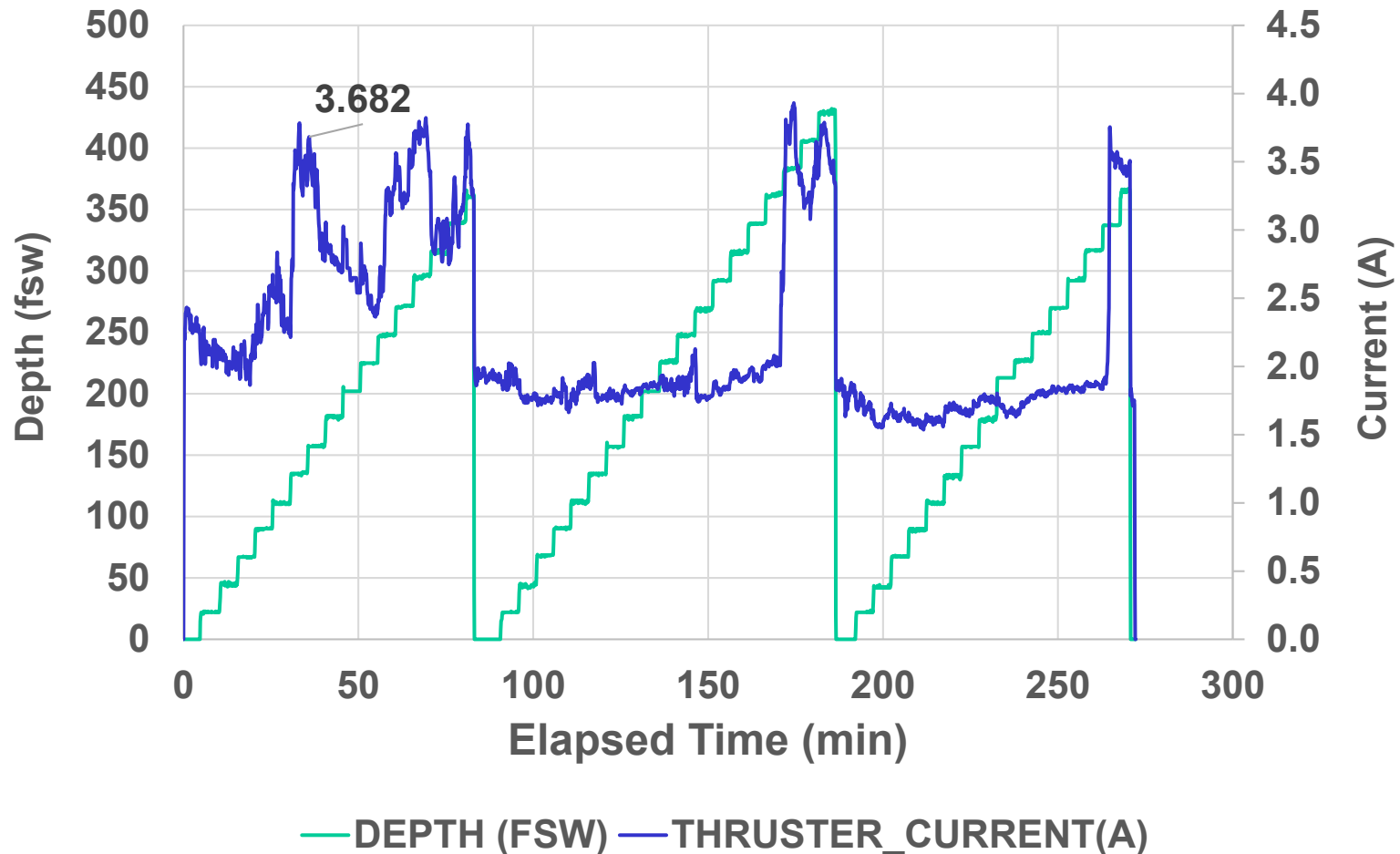
Original Lip Seals





Case 2 - Current

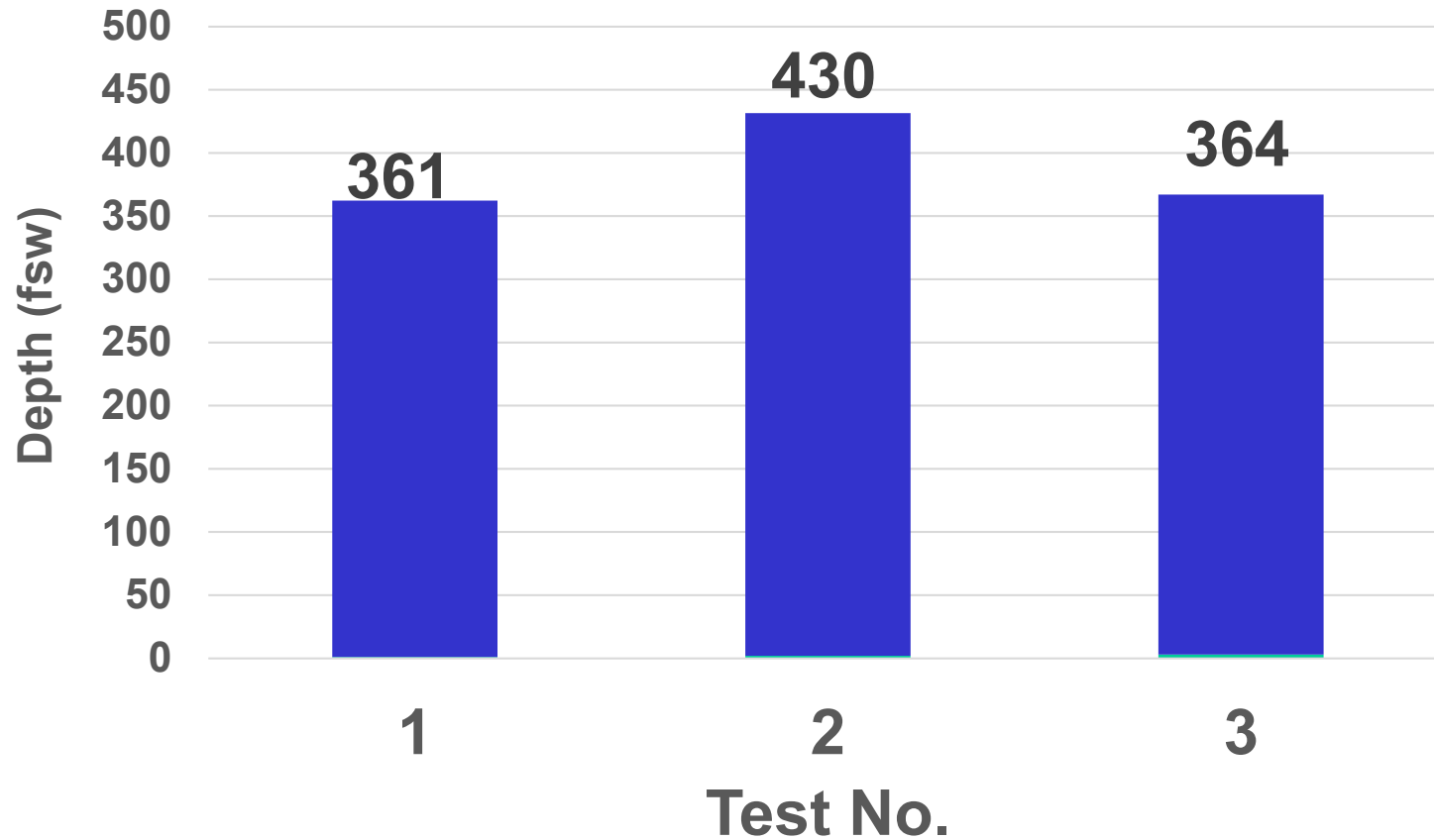
Original Lip Seals



Case 2 – Max Depth



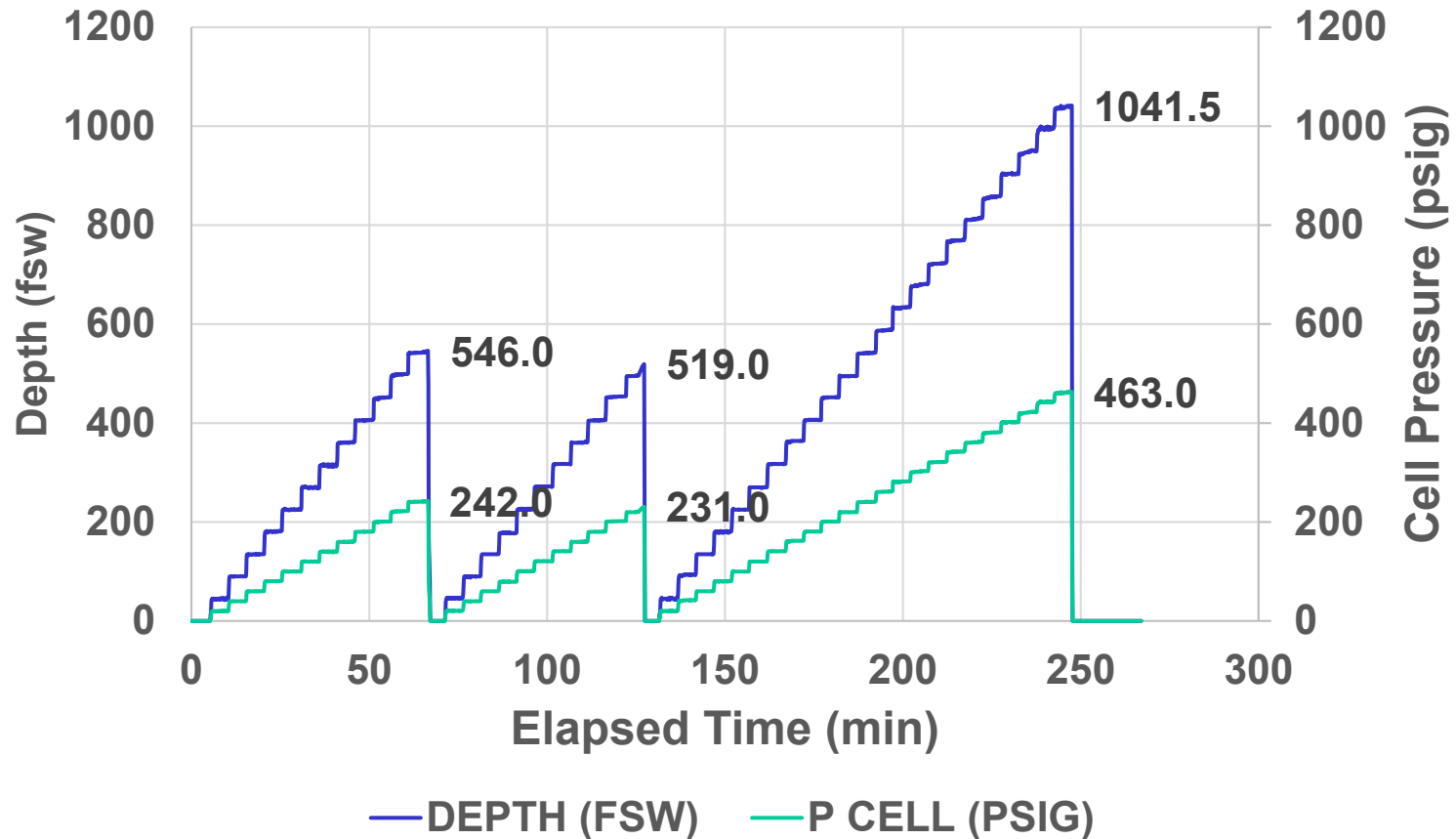
Original Lip Seals





Case 3 - Depth

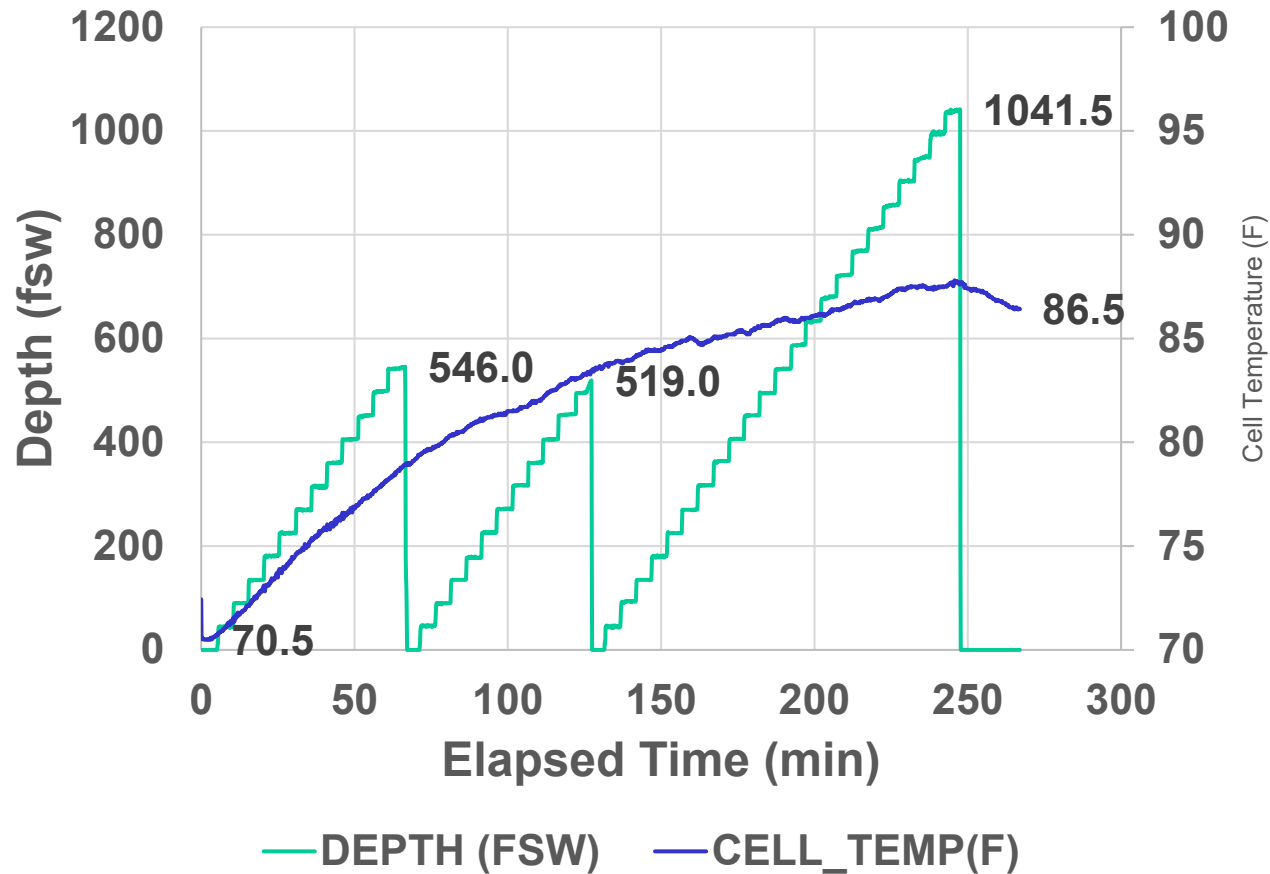
Parker FlexiSeal - Break-In





Case 3 - Temperature

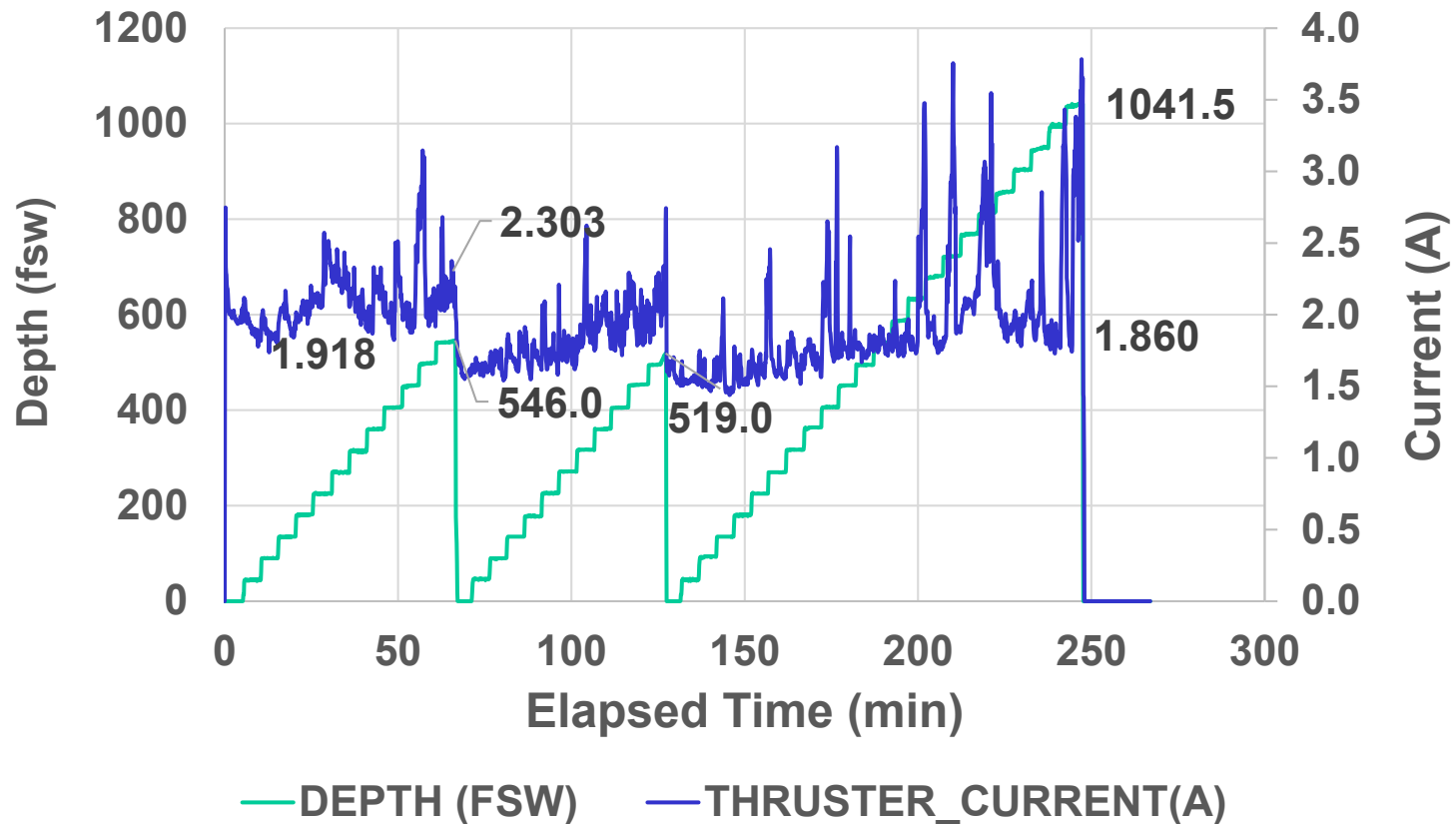
Parker FlexiSeal Break-In





Case 3 - Current

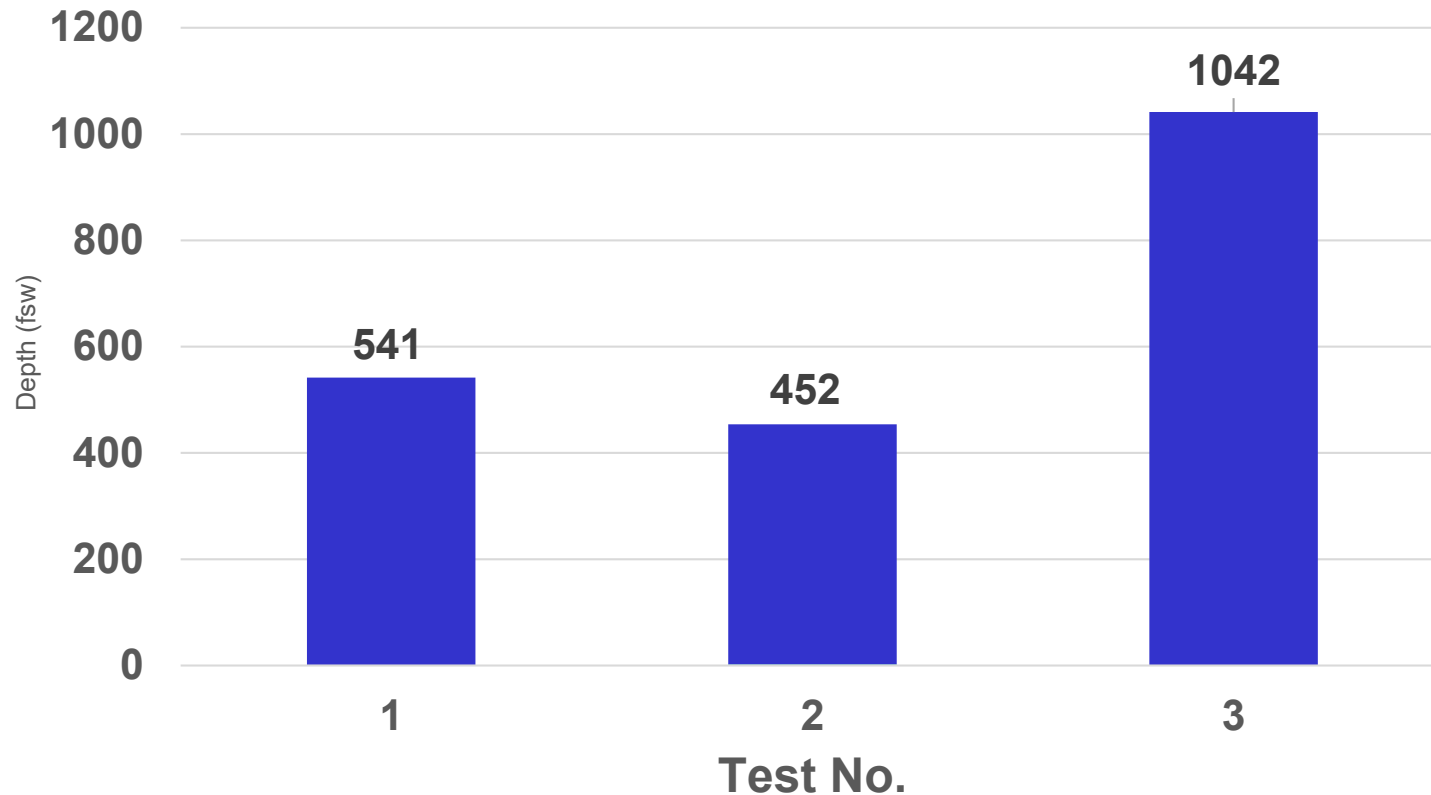
Parker FlexiSeal - Break-In





Case 3 – Max Depth

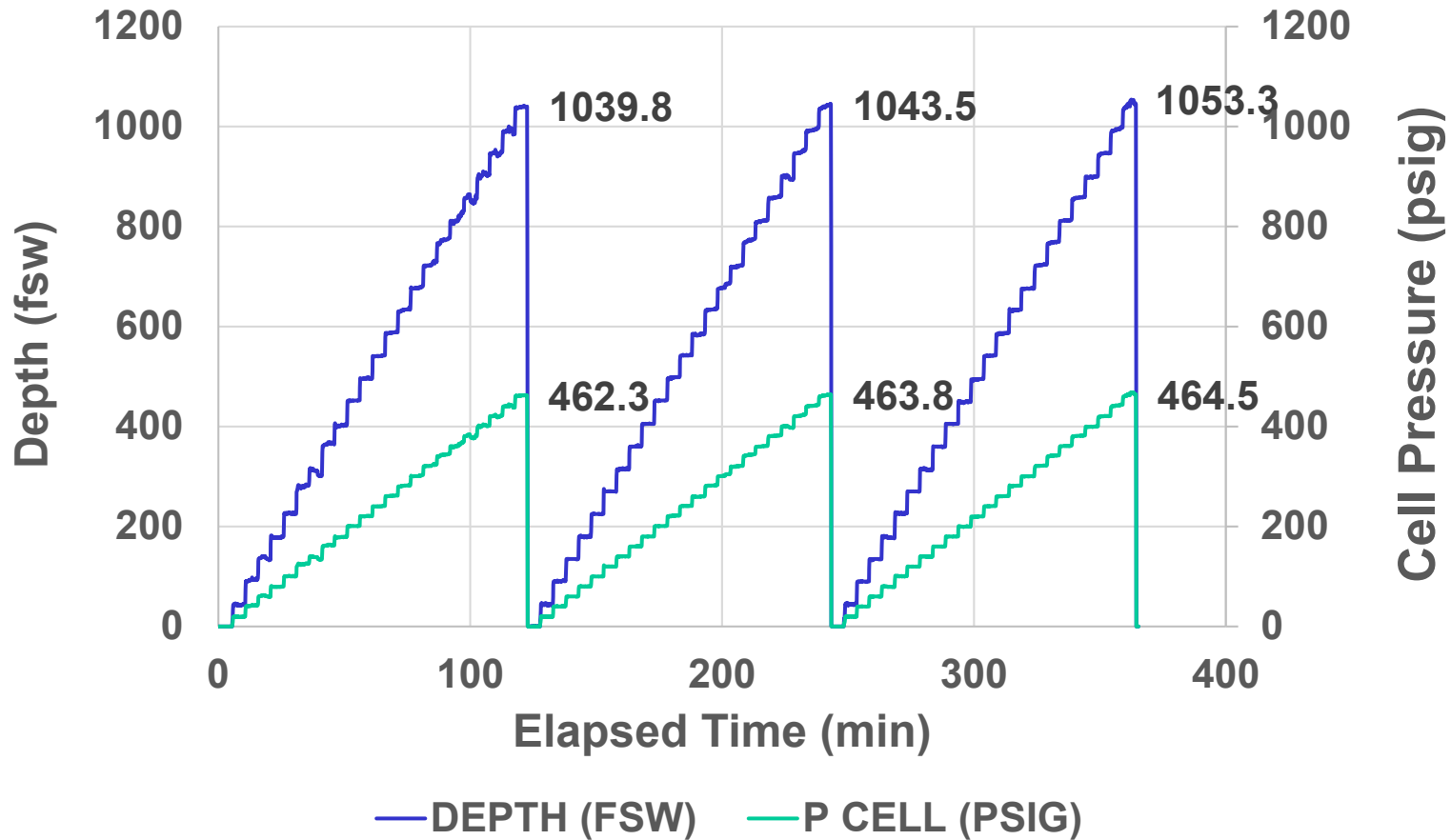
Parker FlexiSeal - Break-In





Case 4 – Depth

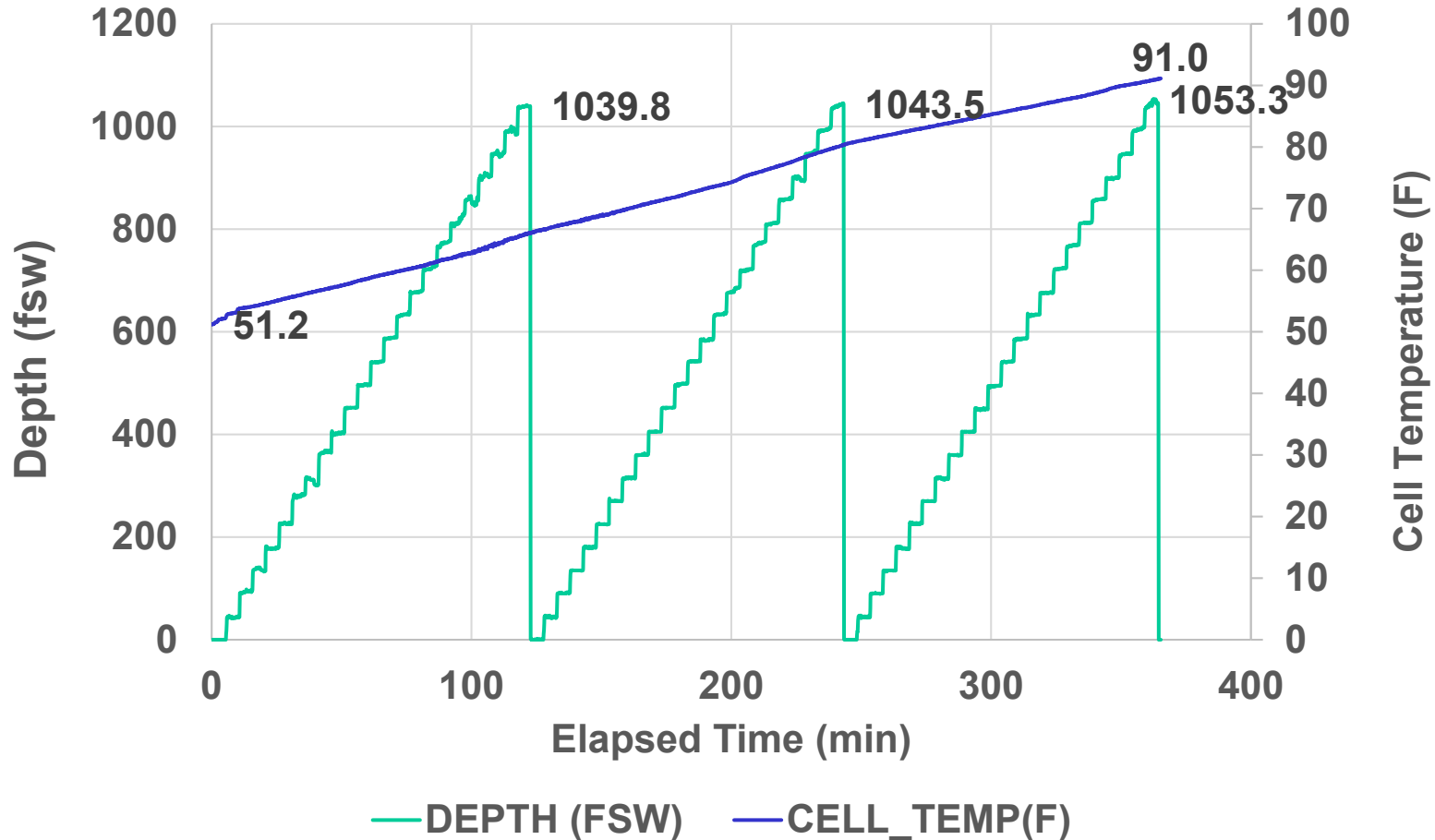
Parker FlexiSeal - After Break-In





Case 4 – Temperature

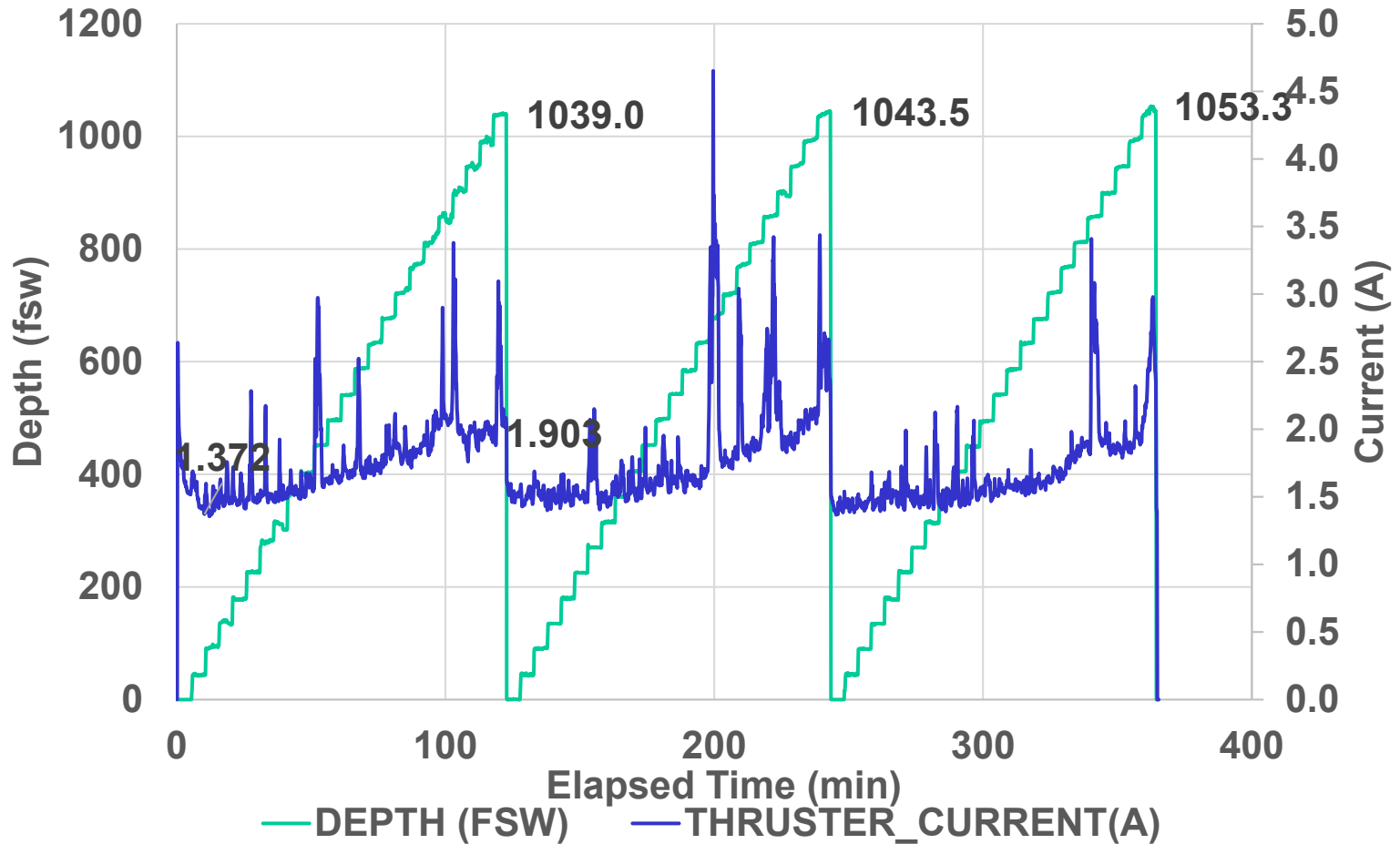
Parker FlexiSeal - After Break-In





Case 4 – Current

Parker FlexiSeal - After Break-In

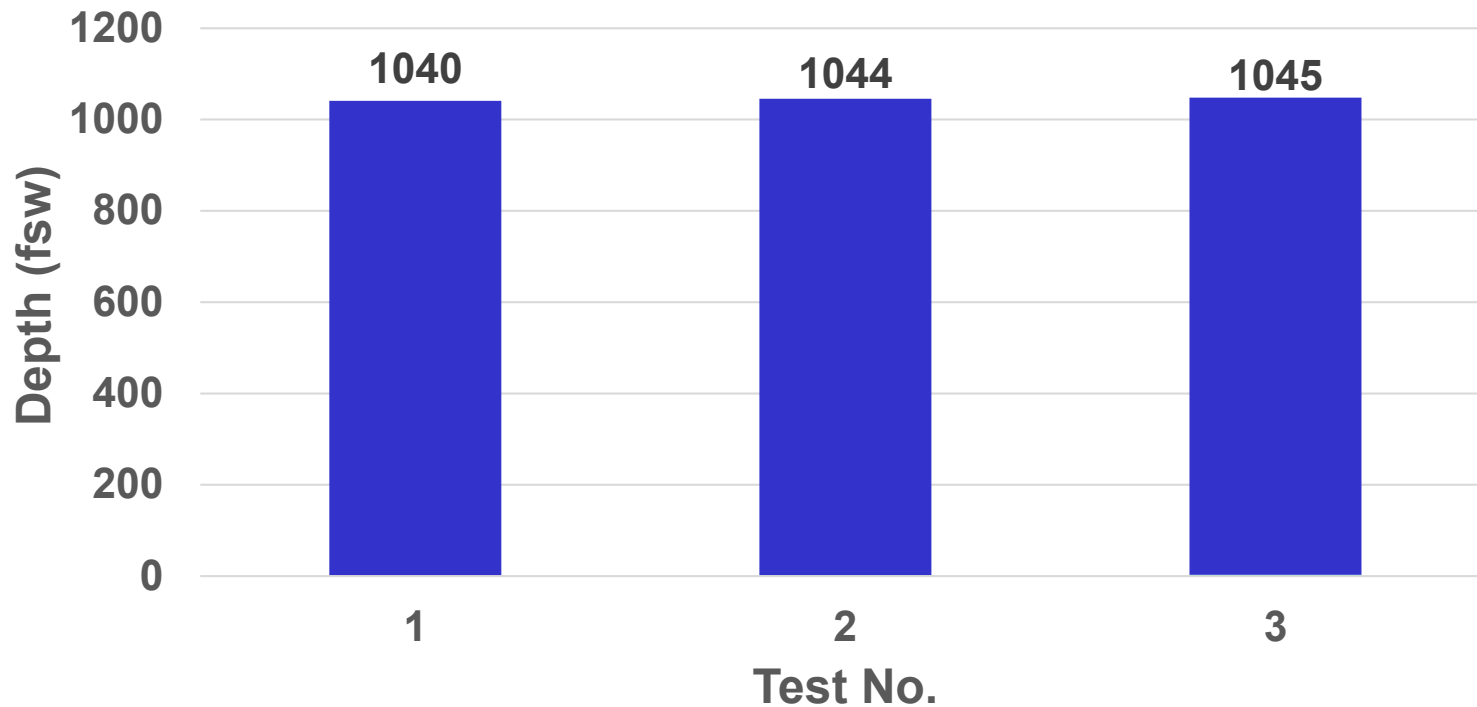


Case 4 – Max Depth



Parker FlexiSeal - After Break-In

Maximum Test Depth



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Conclusions



- 1. The off the shelf Minn-Kota 101 lower unit can be used without pressure compensation to a depth of 300 fsw. While there is some variability around the onset depth for leakage past the dual lip seals, 300 fsw is a conservative value. In one case, leakage did not occur until 810 fsw.**

Conclusions



- 2. By replacing the dual lip seals in the Minn-Kota 101 lower unit with a Parker FlexiSeal Rotary Seal part no. 0301-FC-S-187-00500-260-S-C-M, the maximum depth can be increased to at least 1,000 fsw. Utilizing this high pressure lip seal requires a custom seal adapter to be fabricated.**

Conclusions



- 3. At a depth of 300 fsw, the current draw was 23% lower with the Parker seal than using the OEM seal. However, it should be noted that the unit was run with no prop attached in all tests. The 23% reduction represents an efficiency gain in shaft drag only, not in the motor's total current draw with a prop installed.**

Conclusions



- 4. Break-in of the Parker lip seal occurred after 2 hours and 7 minutes**
- 5. In all test cases (fresh water only) with the original seal set, even when leakage occurred, the lower unit continued to operate.**
- 6. No mechanical failure of the LU housing was observed.**

Future Work



- ✓ **Corrosion Mitigation of Seal Adapter**
- ✓ **Evaluate Minn Kota – 112 Lower Unit for the same seal adapter**
- ✓ **Track field experience with:**
 - ✓ R300
 - ✓ Shackleton
 - ✓ VAST
 - ✓ Aquatic