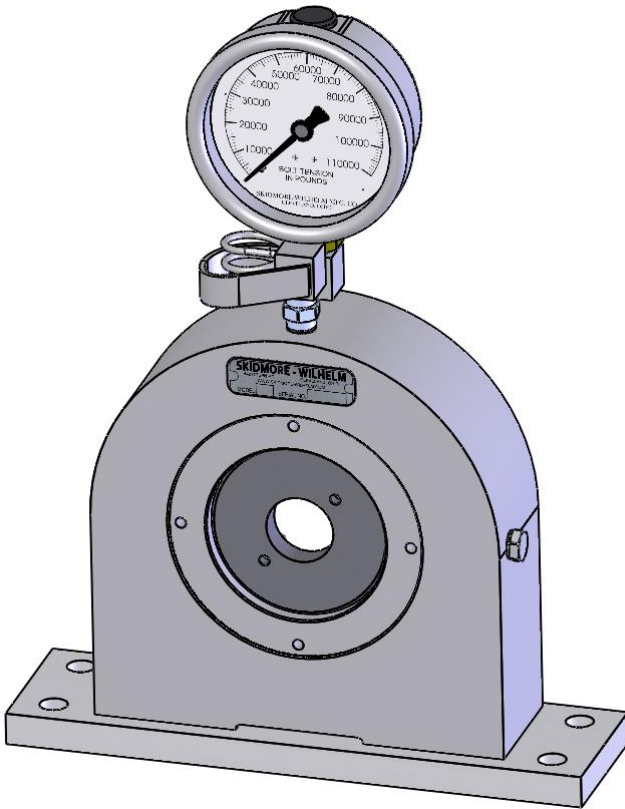


USER MANUAL

MODEL RL-105

POWER TOOL TESTER



SKIDMOREWILHELM

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Introduction

Thank you for purchasing the Skidmore-Wilhelm RL-105 Power Tool Tester. Our design builds on over 50 years of industry leading experience in bolt tension measurement and power tool testing while maintaining the accuracy, reliability, ease of use and technical support that you have come to expect from Skidmore-Wilhelm.

Note: This document can be downloaded in PDF format from the Skidmore-Wilhelm website: www.skidmore-wilhelm.com

Typical Testing Applications

The Tool Tester is used with an appropriately sized precision Test Bolt Assembly to verify the performance of a wide variety of power tools including but not limited to: impact wrenches, pneumatic/hydraulic/electric wrenches, nut runners, stall tools etc.

Safety



Safety First. Read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during use. Skidmore-Wilhelm cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Skidmore-Wilhelm when in doubt as to the proper safety precautions and operations. **Failure to follow the proper safety procedures can cause equipment damage and/or personal injury.**

Principle of Operation

The Tool Tester is an oil filled hydraulic load cell with a hole through the center of the piston & body. A typical setup with a precision Test Bolt Assembly installed is shown in Figure 1.

As the Test Nut is tightened, the Test Bolt stretches and the piston applies a compressive force to the hydraulic oil contained between the piston and calibrator body. This force causes a pressure increase in the hydraulic oil that is proportional to the increase in tension generated in the Test Bolt. A specially calibrated gage measures the pressure and provides a reading of equivalent **tensile force** developed in the bolt.

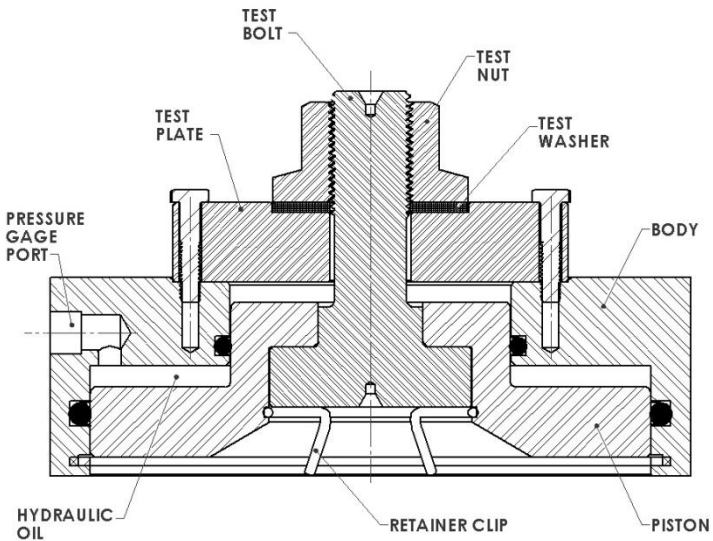


Figure 1, Typical Tool Tester Cross-Section

Tool Tester Setup & Operation

Mounting the Tool Tester

The Tool Tester must be securely fastened to a sturdy level workbench using four 1/2" grade 8 bolts as shown in Figure 2.

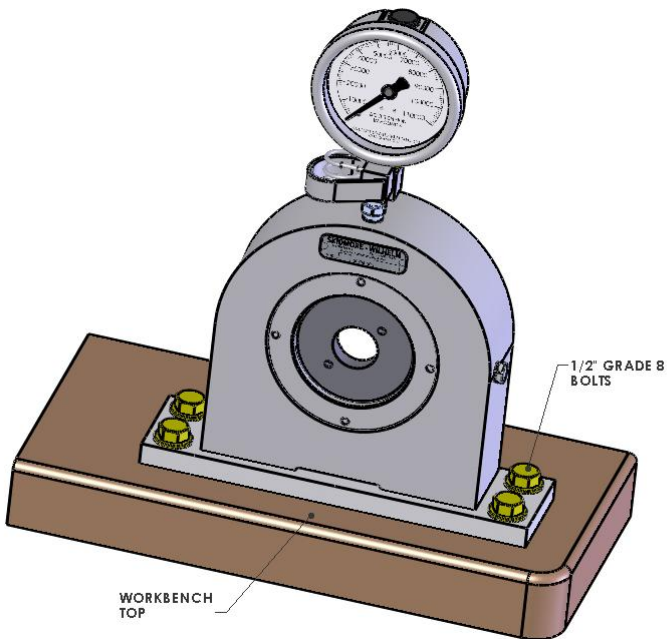


Figure 2, Typical Bench Top Mounting

See Figure 3 for a dimensioned reference drawing of the required hole pattern.

Base Plate Hole Pattern Drawing

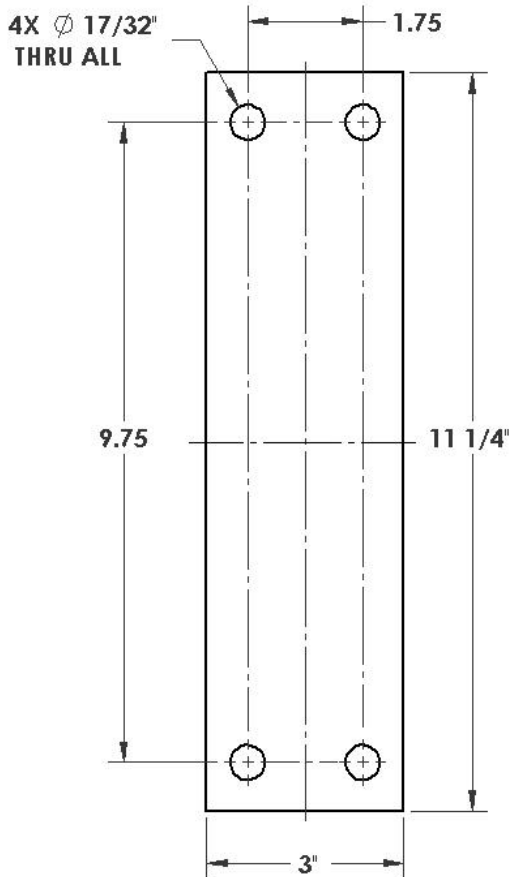


Figure 3, Base Plate Bolt Hole Pattern

Selecting the Proper Test Bolt Assembly

A precision Test Bolt Assembly includes a Test Plate, Test Bolt, Test Nut and Test Washer as shown in Figure 4

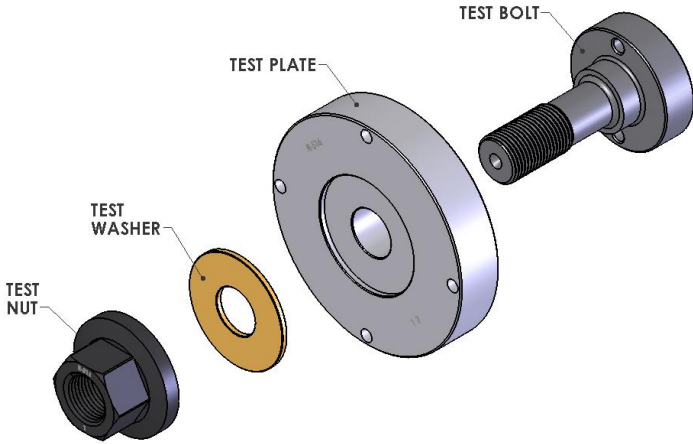


Figure 4, Test Bolt Assembly

Test Bolt Assemblies are selected based on the **maximum expected output torque** of the power tool to be tested. Refer to the *Test Bolt Assembly Selection Chart* in Figure 5.

RL-105 TEST BOLT ASSEMBLY SELECTION CHART						
PART #	Nominal Test Bolt Diameter	Test Nut Hex Size	Max. Torque (ft-lb)	Max. Tension (lbf)	Max. Torque (N-m)	Max. Tension (kN)
R-112	3/4"	1-1/4"	350	40,000	475	175
R-116	1"	1-1/2"	800	70,000	1085	310
R-120	1-1/4"	2"	1500	110,000	2035	490

Figure 5, Test Bolt Assembly Selection Chart

Installing the Test Bolt Assembly

Install the Test Bolt Assembly in the Tool Tester referencing Figure 7 as follows:

- Attach the Test Bolt Plate with four ¼-20 mounting screws provided, snug tighten.
- Insert the threaded end of the Test Bolt thru the piston from the back side of the tester. **Align the Test Bolt dowel pin holes with the dowel pins in the piston.**
- Install the retaining clip in the piston groove
- **Apply a liberal amount of R-0050 Test Bolt Lube to the Test Bolt threads, the face of the Test Nut Flange and Test Washer. See Figure 6 & Figure 7.**



Figure 6, R-0050 Test Bolt Lube

- Install the washer and nut on plate side and finger tighten the nut.
- If the Tool Tester has not been used recently, “exercise” it by tightening and loosening the Test Bolt Assembly several times before recording test results.



The Test Bolt must be properly aligned with the dowel pins and fully seated in the piston pocket. The retainer clip must be installed as shown in Figure 7.

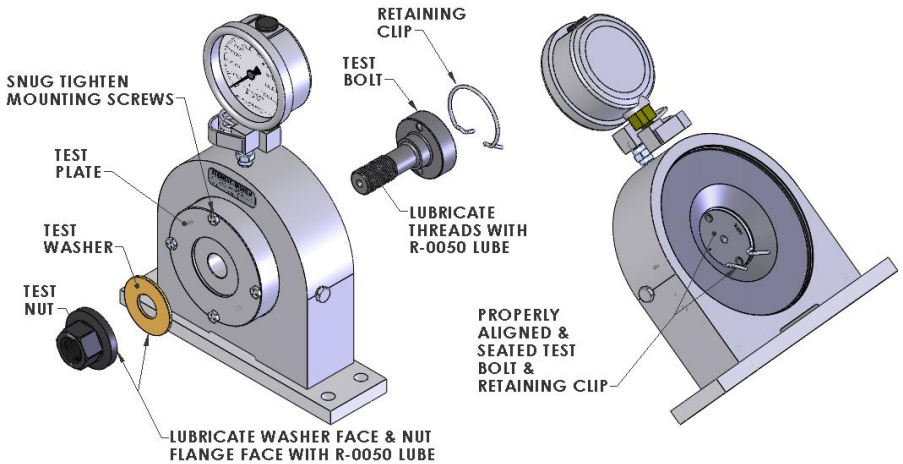


Figure 7, Installation of Test Bolt Assembly



DO NOT leave a Test Bolt Assembly under tension in the Tool Tester for an extended period of time. This can cause premature failure of the sealing system.



Re-apply the R-0050 Test Lube after every 5-10 test cycles. Failure to do so will cause inconsistent test results and premature failure of the Test Bolt Assembly components.

The Material Safety Date Sheet (MSDS) for the R-0050 TEST BOLT LUBE can be downloaded from the following link:

http://www.skidmore-wilhelm.com/pdf/Velox_msd.pdf

How to Read the Gage

The Tool Tester gage measures the **tension** developed in the Test Bolt in units of pounds force (lbf). Dials with metric force (kN) units are also available.

Gage Dial Scale Resolution

The large marks are in increments of 5,000 lbf and the small marks are in increments of 1000 lbf as shown in Figure 8.

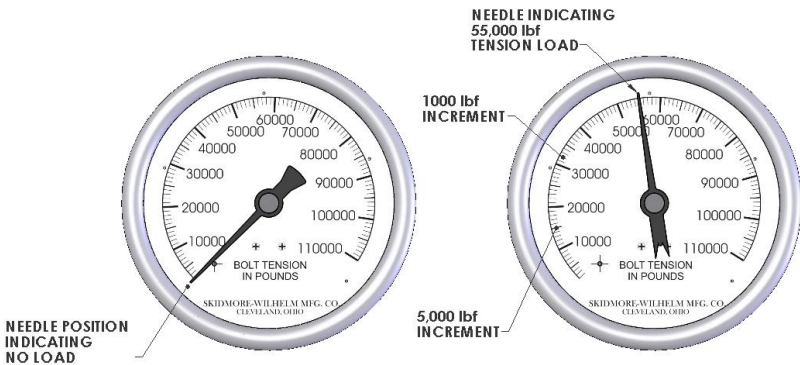


Figure 8, Example of How to Read the Gage Dial



DO NOT exceed the maximum range on the gage dial. This can cause premature failure of the pressure gage.

Impact tools can create excessive vibration that can make it difficult to read the gage dial during tightening. Skidmore-Wilhelm offers an optional Remote Gage Kit that minimizes the vibrational effects. For more information on the Remote Gage Kit, see the *Available Tool Tester Options* section on page 17 of this manual.

Setting Up a Standardized Testing Procedure

You can improve performance, minimize testing variability and reduce maintenance costs by setting up a standardized testing procedure. Establish your standardized testing procedure as follows:

1. Select the proper Test Bolt Assembly. See Figure 5, *Test Bolt Assembly Selection Chart*. **Always use the same size test bolt each time you test a specific power tool.**
2. Install and properly lubricate the Test Bolt Assembly as described on page 8 and tighten the Test Nut finger tight.
3. Apply the power tool to the test bolt assembly for a standard amount of time, usually 5 seconds. The time selected should allow the tool to stall or shutoff. Skidmore-Wilhelm sells an Air Timer Control device that insures that the power tool will be “energized” for a set amount of time. For more information on the Air Timer Control device, see the *Available Tool Tester Options* section on page 17 of this manual.
4. Record the dial reading on the Tool Tester gage. **This reading will be in pounds force (lbf) of bolt tension not torque.** See the *Tension to Torque Conversion* section on page 12 of this manual for information on converting the tension reading to an approximate torque.
5. Reverse the power tool and back off the Test Nut.
6. Repeat steps 2 thru 4 two more times.
7. Determine the average of the three gage readings. This becomes the “Norm” gage reading for the tested power tool.
8. Keep a tool record by serial number. Include all test parameters including test date, Test Bolt Assembly size,

“Norm” gage reading and air pressure if the tool is pneumatic.

Tension to Torque Conversion

Conversion of tension to torque involves several complex factors.

First, an accurate conversion of bolt tension readings to foot-pounds of torque must account for the dynamics of the friction between the Test Bolt threads and between the Test Nut and Test Washer. Tension developed in a bolt by the application of torque can vary greatly as the rate of rotation changes, particularly as the rotation slows to zero.

Second, the effective torque delivered by an impact wrench is related directly to the assembled joint stiffness. The same impact blow delivered to a hard joint will result in a different job torque than a soft joint. Therefore, actual job torque performance can be determined only by testing the actual assembled joint. This also means that tool performance as indicated on the Tool Tester may not equal the torque delivered to the job.

There two different methods that can be used to approximate torque:

Torque Wrench Method

1. Establish the bolt tension “Norm” of the power tool using steps 1-8 of the standardized test procedure.
2. Back off the Test Nut.
3. Tighten the Test Nut using a hand torque wrench until the gage dial reading reaches the “norm”. Note the torque reading on the manual torque wrench. This torque reading approximates the torque output of the tested power tool.

Torque “Factor” Method

We have developed tension to torque conversion “factors” that can be used to calculate an approximate torque number, see Figure 9.

The calculation is very simple:

Approx. Torque = Gage Dial Reading ÷ Torque “Factor”

The Torque “Factors” for each bolt size are shown in

RL-105 TEST BOLT ASSEMBLY TORQUE CONVERSION “FACTORS”	
<i>Test Bolt Size</i>	<i>Torque “Factor”</i>
3/4”	120
1”	90
1-1/4”	70

Figure 9, Test Bolt Assembly Torque Conversion “Factors”



Conversion factors are based on using Skidmore-Wilhelm R-0050 Test Bolt Lube. Test Bolt Assembly components must be in good condition. Conversion factors are best used in the midrange of the Test Bolt’s tensile capacity.

Calibration

All Tool Testers are factory calibrated using precision compression presses, dead weights and/or proving rings that are traceable to NIST standards. A written *Calibration Certificate* is included with each unit.



The Tool Tester should only be re-calibrated by a qualified technician using NIST traceable equipment.



The Tool tester is calibrated as an assembly and disassembly will void the calibration. Removal of the gage for a “pressure calibration” will not provide a true calibration of the assembly.

Skidmore-Wilhelm recommends returning your unit to the factory for re-calibration on an annual basis. This will insure that the Tool Tester performs to original factory specifications. Please consult your own quality requirements or those of the appropriate sanctioning body to determine your required re-calibration cycle.

The following link provides detailed instructions for returning your Tool Tester for calibration:

<http://www.skidmore-wilhelm.com/calibration-request.html>



To avoid shipping damage, always ship the Tool Tester in its original Pelican case. It is not necessary to return the Test Bolt Assemblies.

Maintenance

The Tool Tester requires minimal maintenance. None of the Tool Tester components are user serviceable. Skidmore-Wilhelm will replace the seals every five years as part of our re-calibration service. Please consult us if you notice oil leakage or are unsure if the Tool Tester is performing correctly



Keep the Tool Tester clean and free of excess oil, grease and dirt. Only use cleaning solutions that are compatible with Nitrile rubber.

Replacement Parts for Test Bolt Assemblies

Test Plates should last the life of the Tool Tester. However, Test Bolts, Test Nuts and Test Washers are wear parts that will have to be replaced at regular intervals. Their useful life will be dependent on usage with peak tension loads, lubrication & cleanliness all affecting longevity. See Figure 10 for the Test Bolt Assembly replacement part numbers. All replacement parts are available directly from Skidmore-Wilhelm.

RL-105 TEST BOLT ASSEMBLY REPLACEMENT PARTS	
PART #	Description
M-015	RETAINER CLIP
R-0050	TEST BOLT LUBE
R-212	3/4" TEST BOLT
R-312	3/4" TEST NUT
R-412	3/4" TEST WASHER
R-512	3/4" TEST PLATE
R-216	1" TEST BOLT
R-316	1" TEST NUT
R-416	1" TEST WASHER
R-516	1" TEST PLATE
R-220	1-1/4" TEST BOLT
R-320	1-1/4" TEST NUT
R-420	1-1/4" TEST WASHER
R-520	1-1/4" TEST PLATE

Figure 10, Test Bolt Replacement Part Numbers

Available Tool Tester Options

Remote Gage Kit

Skidmore-Wilhelm offers an optional Remote Gage Kit, part # RGM-100 that allows the gage to be mounted remotely which minimizes the vibrational effects when testing impact tools. See Figure 11. Please contact Skidmore-Wilhelm for more information.

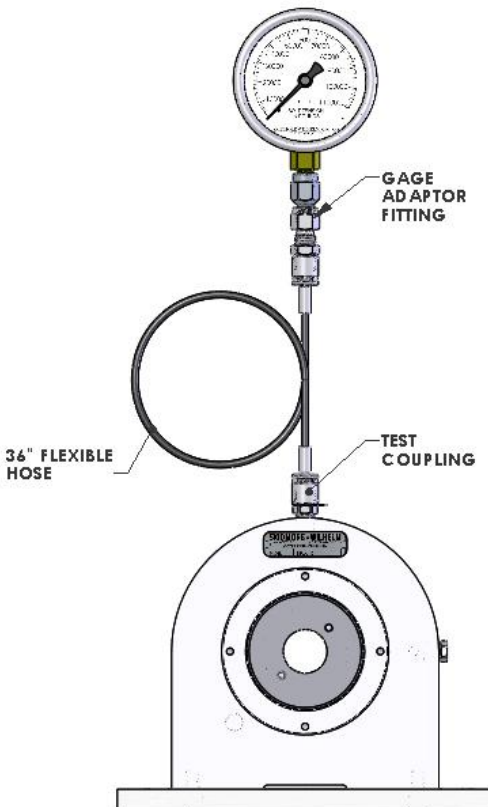


Figure 11, Remote Gage Kit Installation

Air Timer Control Kit

To improve pneumatic tool testing repeatability, Skidmore-Wilhelm offers an optional Air Timer Control Kit. The kit uses an adjustable timer, a foot pedal switch and high flow solenoid to control the time that a pneumatic tool is “energized” during the test procedure. A timer override switch allows the user to bypass the timer as needed.

The kit is configurable in both 110 and 220 AC voltages and with several different size air line connections. Please contact Skidmore-Wilhelm with your requirements.

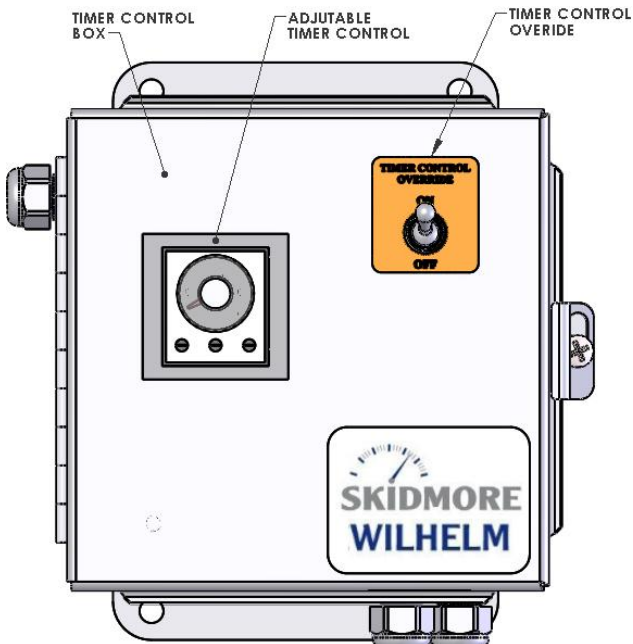


Figure 12, Air Timer Control Box

Product Specifications

Max. Tension Measuring Capacity: 110,000 lbf (500 kN)

Measurement Accuracy: Within 1% of reading above 20,000 lbf

Calibration: Traceable to NIST

Test Bolt Assembly Size Range: 3/4" thru 1-1/4"

Weight (Tester Only): 39 lbs (17.7 kg)

Due to continual product improvements, specifications are subject to change.

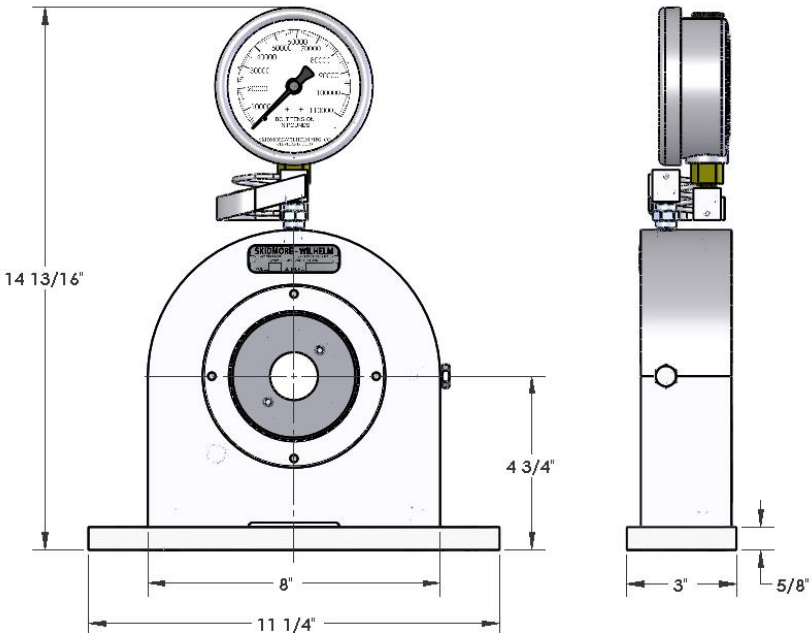


Figure 13, Overall Dimensions