

MODEL CBT – 100
MODEL CBT – 125
MODEL CBT – 200
MODEL CBT – 250
MODEL CBT – 350

CALIBORE™

*CALIBRATION SYSTEM
OPERATING GUIDE*



Norwolf® Tool Works, Inc.

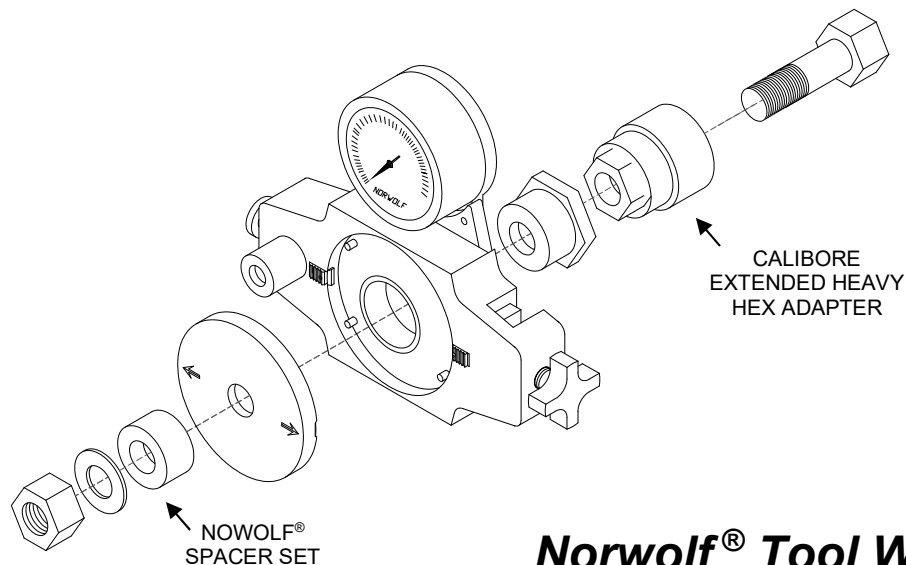
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www.norwolf.com

1. Congratulations on your purchase of a Norwolf® Tool Works, Inc. Calibre™ Bolt Tension Calibrator.
2. Please contact Norwolf® for guidance when you are in doubt as to the operation of this product with your application.
3. Read all instructions, cautions, warnings and notes carefully.
4. Follow all safety precautions to avoid injury or damage during use.
5. The Norwolf® Calibre™ is designed to safely and accurately measure bolt tension in all bolts ranging in size from 5/8" to 2". Plate and hex bushings are available for standard as well as heavy hex bolts. All plate and hex bushings are designed for the shortest minimum bolt length. For longer bolts, custom Norwolf® spacers or rear hex adapters are available in various sizes and lengths. See drawing below.
6. In addition, the Norwolf® Calibre™ can be used to test the performance of impact wrenches. This is accomplished by purchasing Norwolf® test bolt kits that are available in 1-1/4" and 2" and include nut and washer.
7. The Research Council on Structural Connections requires and Norwolf recommends testing of representative sample of not fewer than three complete fastener assemblies of each combination of diameter, length, grade and lot to be used in the work, checked at the site of installation.



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CALIBORE SET-UP

The Norwolf® Calibore™ must be affixed securely.

This can be done in any one of the following ways and depends on operator preference and environment:

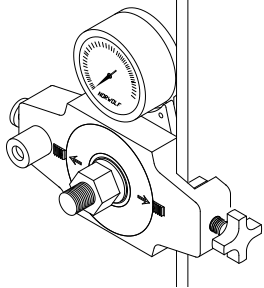
1. Beam mount. Clamp should be hand tightened and then tapped using Norwolf optional hex bar or other tapping device to assure secure mount.

Caution: Vibrations, especially from an impact wrench, will cause clamp to loosen. Mounting clamp knob must be tightened securely.

2. Table / bench mount with Norwolf optional mounting plate. Mount plate at edge of table / bench drilling up from under table / bench. $\frac{1}{2}$ " – 13 TPI screw holes are provided on underside of Calibore™ 100 and 125. Mounting the Calibore 200 and 250 requires (4) $\frac{5}{8}$ " – 11 TPI. Screws should be recessed $\frac{3}{4}$ " into Calibore™.

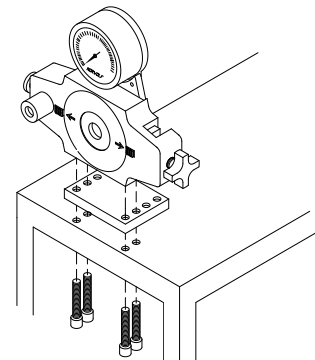
Note: If table / bench mounting, mount at edge so to avoid any interference when calibrating with low clearance hydraulic wrenches or Missing Link.

3. Vise mount. Clamp Calibore to a vise held piece of metal as depicted in drawing below.

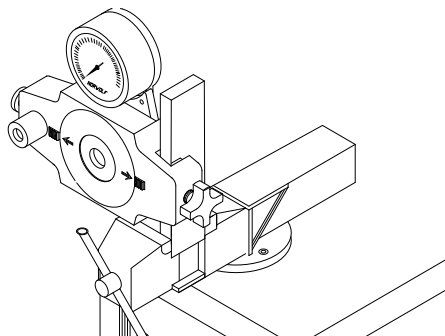


BEAM MOUNT

Note: Vibration from an impact wrench will cause knob to loosen. Tap clamping knob securely with hammer.



BENCH MOUNT



CLAMP TO METAL BAR HELD IN VISE

TO CALIBRATE BOLT TENSION

1. Select “fastener assembly” which consists of a bolt, washer and nut to be tensioned.
 - a. Note: Required Minimum Bolt Length chart appears on following page.
2. Select Calibore front plate and rear hex bushing that corresponds with nominal bolt diameter of “fastener assembly”.
3. Snap in “front plate” making sure the (4) holes on the back of the front plate are aligned with the (4) dowel pins of the Calibore. Arrow labels should align with spring clip.
4. Snap in rear hex bushing through back of Calibore into place.

Note: Slide thumb clasps (see drawing below) to remove or change front plate and rear hex bushing.

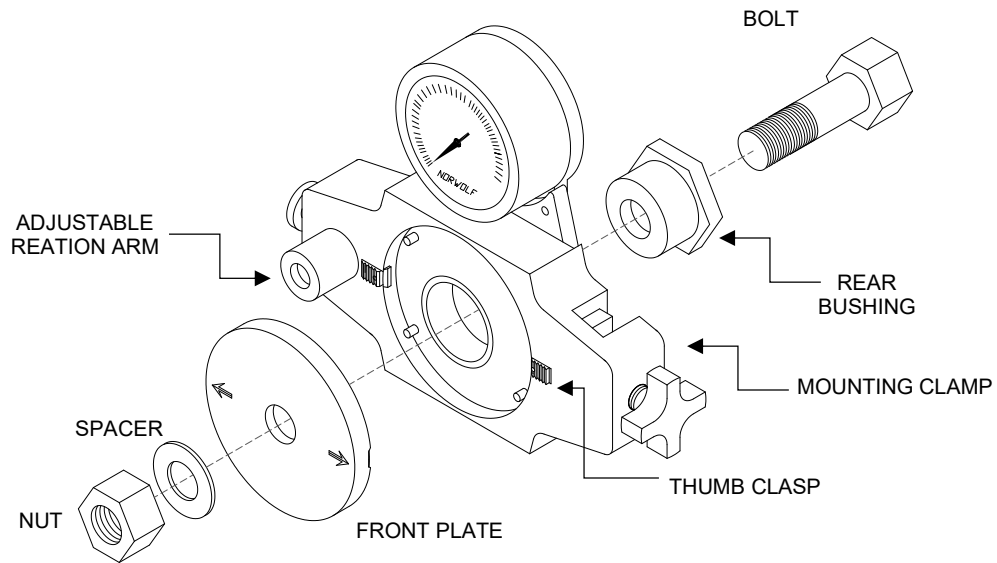
5. Insert fastener assembly bolt through the back of the Calibore so that the hex of the bolt is nestled in the bushing hex. Lubricate as recommended by fastener manufacturer.
6. Place hardened washer then nut on bolt at the front of the Calibore. Alignment of Calibore parts and fastener assembly is as depicted in drawing.
7. Adjust built-in Reaction Arm. Utilize Reaction Arm with tools that react such as hydraulic wrench and multipliers. Loosen Reaction Arm knob and adjust so arm is sticking out at front of Calibore. Tighten knob so to lock into place. For use with a non-reacting tool, the Reaction Arm should be no less than flush with the front of the Calibore.

Note: Reaction Arm must be no less than flush with back of Calibore when in use.

Note: If reacting tool misses reaction arm or only partially engages, please order a Norwolf Calibore extended Reaction Arm attachment. See photos below.

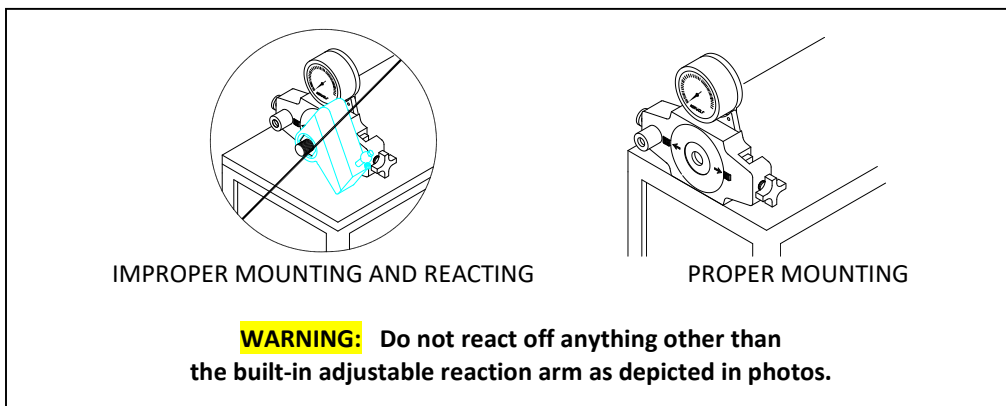
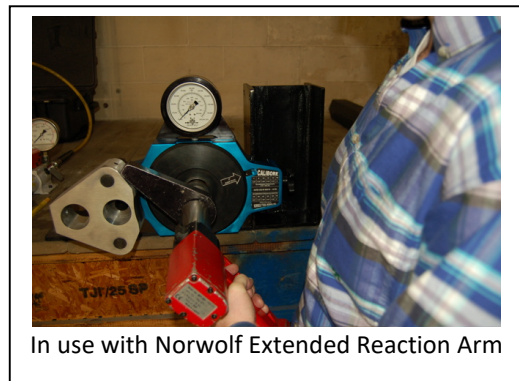
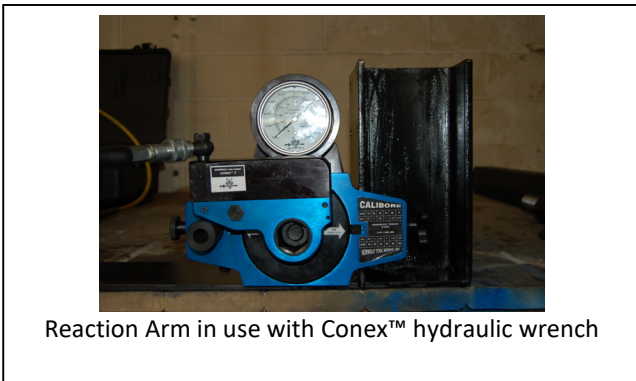
8. Tighten the nut with choice of impact wrench, pneumatic, hydraulic wrench or torque multiplier.

Tightening the fastener assembly creates internal pressure which is transmitted to the Calibore gauge. The gauge gives a direct reading equal to fastener tension in pounds and KiloNewtons.



Note: The built-in adjustable reaction arm must be locked into place whether utilized or not. There are three locking / tightening positions. The reaction arm should never be less than flush with the back when in use and never less than flush with the front of the Calibore when not in use.

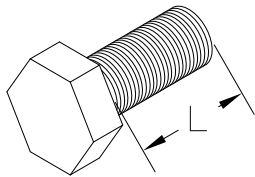
WARNING: DO NOT REACT OFF ANYTHING EXCEPT THE BUILT-IN ADJUSTABLE REACTION ARM. REACTION OFF ANYTHING ELSE WILL CAUSE DAMAGE TO THE BODY OF THE CALIBORE.



As written and recommended by ASTM, the following minimum bolt tension is required for testing A325 and A490 bolts:

MINIMUM BOLT TENSION IN KIPS		
BOLT SIZE	ASTM A325	ASTM A490
½"	12	15
5/8"	19	24
¾"	28	35
7/8"	39	49
1"	51	64
1-1/8"	56	80
1-1/4"	71	102
1-3/8"	71	
1-1/2"	86	
1-5/8"	105	
1-3/4"	122	
1-7/8"	144	
2"	165	

Minimum Bolt Length:



REQUIRED MINIMUM BOLT LENGTH		
LC 100	BOLT DIAMETER	LC 125
1-1/2"	½"	1-1/2"
1-5/8" L	5/8"	1-5/8" L
1-3/4" L	3/4"	1-3/4" L
1-7/8" L	7/8"	1-7/8" L
2" L	1"	3" L
3-1/8" L	1-1/8"	3-1/8" L
3-1/4" L	1-1/4"	3-1/4" L
LC 200	BOLT DIAMETER	LC 250
3-1/8"	1-3/8"	3-3/4"
3-1/4"	1-1/2"	3-7/8"
3-3/8"	1-5/8"	4"
3-1/2"	1-3/4"	4-1/8"
4-3/8"	1-7/8"	4-3/8"
4-1/2"	2"	4-1/2"

Tension Control Bolts:

Tension Control bolts, aka TC bolts, often have round heads and therefore special bushings are required and available from Norwolf Tool Works.

Direct Tension Indicators:

Load indicating washers or DTI's are calibrated in the same fashion as any normal fastener assembly. No special adapters/bushings are needed.

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MAINTENANCE

1. Wipe the body of the Calibore thoroughly clean after use.
2. Check that all screws are secure after major use. If screws are loosening, add Blue Lock-Tight.
3. Make sure hydraulic oil has not escaped by measuring gap in rear of Calibore™. If the piston and the ring around piston have more than a 1/8" level difference, add hydraulic oil.
4. Store in fitted case.
5. Calibration of Norwolf Calibore should be performed annually.

LIMITED WARRANTY:

Norwolf Tool Works, Inc. warrants this product to be free from defects in material and workmanship for a period of one year from the date of purchase.

NOTES:

1. Gauge should be kept in upright position at all times to avoid air pocket formation in glycerin. Carrying case set on wheels will keep gauge in the upright position.
2. For use in extreme cold weather (below freezing), remove both gauge cover and gauge back plate so plug on top of gauge is expose. Turn entire unit over and drain glycerin into suitable container so it does not freeze in gauge. Glycerin may be saved and returned to gauge at a later time.
3. Norwolf Tool Works, Inc. does not recommend using an impact wrench without glycerin filled gauge.
4. Pictured are tools used with Calibore.

