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Technical Reference Manual

M2 Series

Torque Instrument Calibration Instructions

M2FR100F
M2R100F
M2R1000H

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M2 Series

Torque Instrument Calibration Instructions

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Testing

According to testing standards for all “M” torque wrenches, TTD master testers will be used to establish verification of accuracy. The TD 1000 will be used to verify calibration of the M2 series. Testing is accomplished per the Precision Instruments PI-QCM in the vertical down position. Speed of loading (within 20% of the set point) is reduced and applied smoothly not to exceed 5% of the target value or set point per second.

The wrench will be tested in the clockwise direction first but prior to this, the wrench will be set to 50% of full scale and operated three times in the clockwise direction. The test will be performed with three release values obtained (in the clockwise direction) at 20%, 60%, and then 100% of full scale.

When tests are performed in the counter clockwise direction, the wrench will be set at 50% of full scale and operated 3 times in the counter clockwise direction prior to the tabulation of readings at 20%, 60% and then

100%.

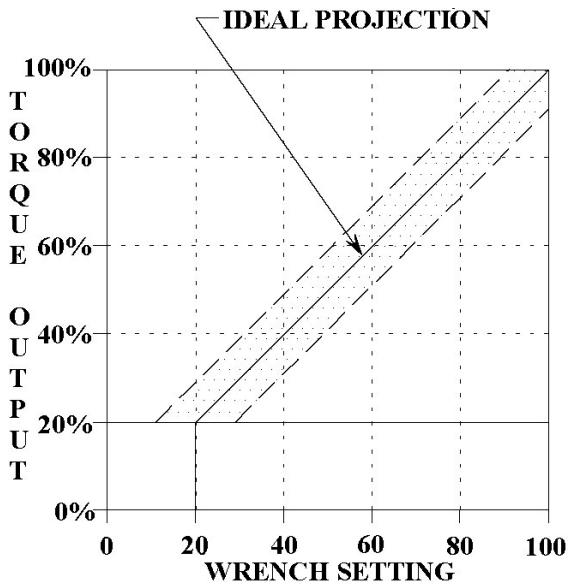
Whenever the direction of testing is changed, the wrench will be operated three times at 50% first in the same direction before testing.

Calibration

Most national torque wrench test standards require accuracy to be within plus or minus 4% of the reading from 20% of full scale to the full scale reading clockwise and plus or minus 6% of the reading counter-clockwise through the same range.

The “M” Torque Instruments should be compared to a standard of plus or minus 3% of reading from 20% of full scale to full scale in both directions.

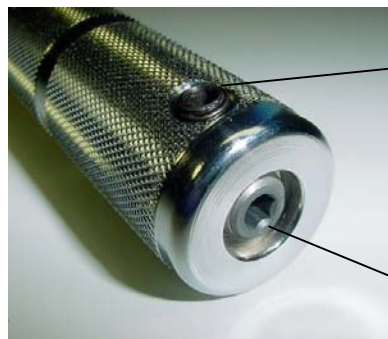
Simple Primary Calibration Procedure



PROBLEM

Torque output is approximately parallel with, but is above or below ideal projection.

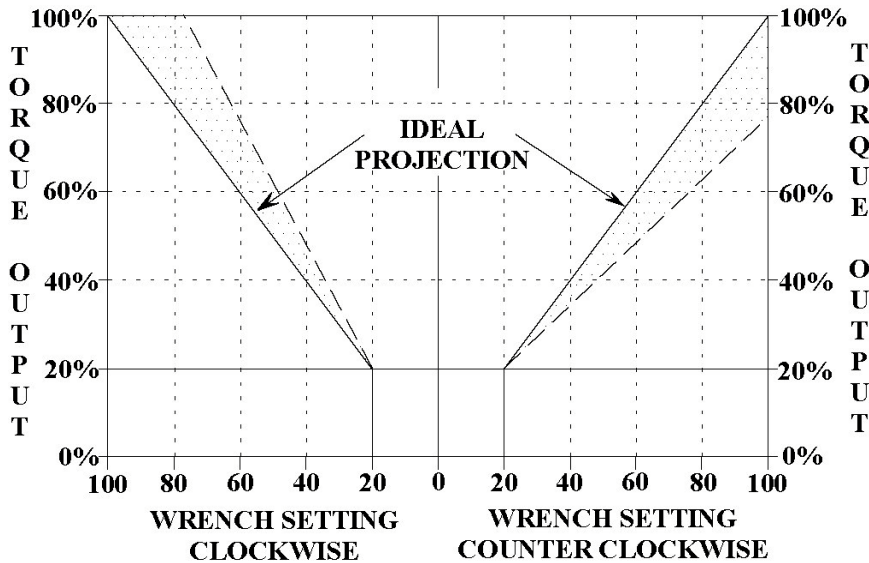
Record the reading at 20% of full scale and full scale in both clockwise and counter-clockwise directions. If the readings are out of specification, it will generally be noted that the majority of readings tend to be high or low. To adjust all readings up or down, remove the sealant at "A" and the calibration plug at "B" (see below). Set the wrench to full scale and lock. If repeated tests at full scale in both directions indicate that the average of readings should be raised or lowered, loosen the socket set screw at "A" with a standard 5/32" hex key. Insert a 3/16" hex key in the handle end "B" and turn clockwise to raise or counter-clockwise to lower all readings (1/4 turn for starters). Check at 20% and full scale both directions and adjust the setting to "average" all readings for best calibration. When properly adjusted, torque the socket set screw "A" to 60 Lb. In. Recheck the calibration at 20%, 60% and full scale in both directions. This will usually complete the calibration procedure.



Seal "A"

Seal "B"

Balance Cam Adjustment



PROBLEM

Torque output is out of balance between CW and CCW applications (such as) CW is plus while CCW is minus.

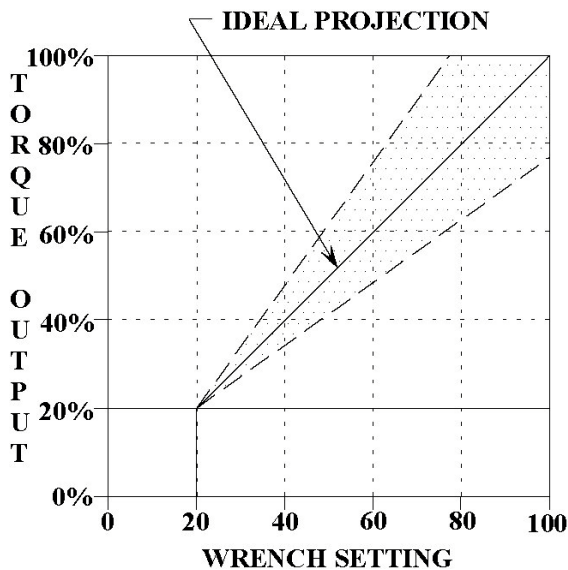
In some instances, the average of all clockwise readings will be significantly different than the average of the counter-clockwise readings. If the difference interferes with the proper calibration, the balance cam can be turned from the outside to achieve proper balance.

Set and lock the wrench at the full-scale reading. Compare the average of three clockwise and counter-clockwise torque applications. Insert the balance cam-adjusting tool TQN565 (see below) into the handle end as far as it will go. Make sure to engage the hex socket of the balance cam.

Turn the TQN565 10 degrees clockwise; some resistance to turning should be noticed. Remove the tool and to let components "settle", click the wrench twice before recording the third reading. Check the release value in both directions. If the balance has improved but not yet enough, turn a little more in the same direction and check balance again. If the balance worsened when turning clockwise, proceed in the counter clockwise direction. Repeat previous simple primary calibration procedure as necessary.



Spring Rate Adjustment



PROBLEM

Torque in a given direction can't be matched at both top and bottom (if 20% is ok, 100% is out etc).

In a few instances, the spring rate needs adjusting. An unequal variation or nonlinearity in the readings at different calibration points indicates this condition. For example, if the wrench releases at 20% of full scale according to the tester when set to that value but releases at 105% on the tester when set to 100%, the spring rate must be adjusted. With the above example, the torque releases are climbing faster than the setting indications.

To reduce the spring rate, first set the wrench to full scale and lock. Insert TQN566 (see below) spring rate adjusting tool all the way into the end of the handle as far as it will go and engage the internal hex socket. To reduce the spring rate from that illustrated above, turn the TQN566 clockwise only about 10 degrees. This adjustment is very sensitive. Turning in the counter-clockwise direction will increase the spring rate. Always "click" the wrench twice before recording the third reading (to let components "settle").

Caution! When making a spring rate adjustment, always set the wrench to full scale. Make sure that the TQN566 is inserted all the way into the internal hex socket. Half engagement will cause "cam-out" which will damage the wrench.

After adjustment is made set the wrench to full scale and test both clockwise and counter-clockwise. Next check at 20% and full scale in both directions. If the spring rate is now correct, all the readings may be raised or lowered slightly if necessary using the simple primary calibration procedure.



TQN527 SPRING RATE ADJUSTING TOOL